Who Vaccinates Our Children? A Map of the Immunization Delivery System in Kansas

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EXECUTIVE SUMMARY

For many years Kansas has experienced difficulty in sustaining high immunization rates among the children in the state, and its progress towards the national goal of 90 percent coverage often has not compared favorably with that in other states. Factors often mentioned to explain this difficulty include a shortage of primary care providers, especially in rural areas, and a poor level of participation by private providers in immunization activities. There are anecdotal reports that providers in Kansas refer their pediatric clients to local health departments (LHDs) to receive their vaccines, and the rate of participation of private providers in the federal Vaccines for Children (VFC) program is low, whereas all LHDs are participants in this program. This report presents the results of a study to map the immunization delivery system in the state and identify possible opportunities for improvement.

This study targeted private clinics and local health departments. A private clinic was defined as a location where one or more physicians deliver primary care to children. Private clinics were identified by grouping licensed physicians in the state to a common address in a clinic, as well as by using other public records and directories.

Two surveys were developed for this study. One was sent to private clinics and asked them to describe their participation in immunization activities and in the VFC program. A second survey was sent to all LHDs in the state and contained questions about the extent to which they offered immunizations to all children or only to some groups (e.g., uninsured children), as well as questions on billing practices.

The survey of private clinics was completed by 424 clinics out of the 479 that were considered eligible, with a response rate of 88.5 percent. Some of the main results from the study include the following:

- At least one private primary care clinic serving children was identified in 88.6 percent of Kansas counties. Twelve counties in the state lacked a private primary care clinic.
- Almost 40 percent of the primary care clinics identified are individual provider (solo) practices. Even in urban counties where multi-provider clinics are more common, solo

clinics represent over one third of all the clinics. Two thirds of the private clinics are associated in some form of networks (e.g., hospital-owned or network practice).

- Of the 424 responding primary care clinics, 277 (65 percent) offer immunizations at least to some of their pediatric clients. There are 49 counties out of 105 in the state in which no private immunization clinic is present (12 with no private primary care clinic and 37 with at least one private primary care clinic, but no private clinic offering immunization services).
- Approximately half (50.9 percent) of the private clinics that provide immunizations are enrolled in the VFC program (the national average reported in 1997 was 81 percent of private clinics offering immunizations). Enrollment rate in VFC among private immunization clinics in Kansas is lower in urban counties.
- Less than 60 percent of private clinics that provide immunizations accept Medicaid or State Children Health Insurance Program (SCHIP) clients.
- Clinics in urban and semi-urban counties, clinics in counties with 600 or more children ages 0 to 5, and medium to large clinics are more likely to provide immunizations. Of these factors, the size of the population ages 0 to 5 seems to be the most important factor in affecting the decision of a clinic to provide immunizations. The odds of being a clinic that offers immunization services are 12.1 times greater in counties with 600 or more children compared to counties that have fewer than 600 children.
- Like in private clinics, in many LHDs immunizations are only available for certain groups of children. Just about half of the LHDs can bill all insurance companies, and 73 percent can bill Blue Cross and Blue Shield (the most common insurance carrier in the state). In addition, slightly more than one third of health departments report having an official sliding fee scale for immunization services.
- Based on findings from this study and other published literature, Kansas ranks among the lowest seven states in the country for private share of vaccination activities, measured both by the percentage of all immunization clinics that are private and by the proportion of children that receive all their immunizations from private providers.

These findings raise several important issues that can affect strategies and policy decisions aimed to improve and sustain high immunization rates among young children in Kansas. Are the primary care and the immunization service systems for children in Kansas adequate to meet demand? Should efforts be made to increase private clinics' participation in immunization programs? If so, which clinics should be targeted? Would increasing participation of private clinics in immunization activities result in an increase of immunization rates in the state? Based on the results of this study and other available evidence, this report suggests that the following non-exclusive options could be considered, in the context of a broad strategic plan to achieve and sustain high immunization rates:

Option 1 — Remove barriers to the timely delivery of immunizations. Some of the initiatives that can be considered include efforts to recruit more VFC providers among private clinics that already immunize their children and expansion of the number of clinics, both private and public, that offer immunizations to all children, regardless of their insurance status.

Option 2 — Continue to examine the issue of low participation of private providers in Kansas in immunization activities. Efforts should be made to gain additional understanding of the reasons that prevent private clinics from providing immunizations, as well as the impact of the low participation of private clinics in immunization programs on the delivery of timely immunizations.

Option 3 — When trying to involve more private clinics in immunization activities or to minimize access barriers, focus efforts primarily on clinics in urban and semi-urban areas and in counties with at least 600 children ages 0 to 5. In rural areas with fewer than 600 children (even in those lacking private immunization clinics), LHDs seem to be able to assure high immunization rates. Semi-urban and urban areas face more challenges. Immunization rates in these areas are often lower than those in rural areas. These are the places where there is a large number of private clinics that do not offer immunizations, or that offer immunizations only to some groups of children. Since these are also the most populated areas of the state, even small local gains in coverage rates can have substantial effects on the statewide coverage rate.

Option 4 — Whenever possible, efforts to involve more private clinics in immunization services and to remove barriers to access should focus on networks of providers. In these networks, the decision of whether to offer immunization services or to enroll in the VFC program often is made at the central administrative level for all the clinics in the network, which may make these efforts more cost-effective.

In summary, this study confirms that no single change is likely to produce dramatic improvements in immunization rates among children in Kansas. Of particular interest is the finding that simply adding more private clinics in rural counties where no private clinics are available to provide immunizations to children is unlikely to have a substantial impact. Those counties have been traditionally underserved, with few private primary care providers and clinics, but LHDs have been able in general to maintain immunization coverage rates higher than those in more populated counties with a larger number of private clinics. The complexity of the issues involved in assuring timely immunizations to all the children throughout the state requires a coordinated, planned multi-pronged approach.

INTRODUCTION

BACKGROUND

The immunization rates for Kansas children have been inconsistent over time, ranking at times among the lowest in the nation. The progress towards the national goal of 90 percent immunization coverage for children has been slower in Kansas compared to that in other states. To address this long-standing problem, the Governor convened a Blue Ribbon Task Force in March 2004 to study the issue and recommend actions to improve childhood immunization rates. Building on this work, the Kansas Health Foundation is funding a multi-year project, Immunize Kansas Kids (IKK), administered in partnership with the Kansas Health Institute (KHI) and the Kansas Department of Health and Environment (KDHE), along with a dozen other stakeholder groups to assess the problems identified by the task force.[1] The main goal of the project is the development of a multi-year immunization action plan for the state, which will address the underlying barriers embedded in the Kansas immunization delivery system.

To support the IKK project, KHI is engaged in several research activities to identify possible barriers in the immunization delivery process and system. This research constitutes an essential part of the IKK project and is meant to enhance the ability of the IKK steering committee to make decisions about the immunization action plan that are based on the best available evidence. This report focuses on one of the research activities, involving a survey of private clinics and local health departments (LHDs). Much of the background information on what is known about immunization delivery in Kansas has already been examined in the white paper for the IKK project entitled *The 90 Percent Solution — Raising Vaccination Rates for Kansas Children* by Dr. Richard Hoffman and available on the IKK Web site (www.immunizekansaskids.org). This report assumes that the reader is familiar with the "white paper;" therefore, the background information contained in that document will not be repeated here.

The immunization delivery system in Kansas, like in the rest of the country, is managed by both private health care providers and LHD clinics, as well as (in smaller proportion) by safety net clinics (e.g., Federally Qualified Health Centers, non-profit clinics for the medically

[1] For a list of organizations that participate in the IKK steering committee please see www.immunizekansaskids.org.

underserved, etc.). There is evidence from previous studies that the proportion of private providers in Kansas who deliver immunizations to children in their offices is low compared to other states (LeBaron, 2002). This leaves other providers, such as LHDS, with a disproportionate amount of children to serve, and it has been hypothesized that this could have a negative impact on the timeliness of immunizations (LeBaron, 2002). In particular, the challenge for LHD clinics to handle a high number of childhood immunizations, the potential delay in time caused by the process of referral from private providers to LHDs, and the inability of most LHDs to act as "medical homes" for all primary care needs of the children to whom they provide immunizations have been mentioned as reasons for concern. A study published in 2005 showed that VFC-eligible children receiving their immunizations in their medical homes were more likely to be up-to-date than VFC children receiving their immunizations elsewhere (Smith, 2005).

Efforts to study this issue further and to examine the advantages and disadvantages of the option of enrolling more private providers to deliver immunizations in their offices require a "map" of the immunization delivery system in Kansas, which this report attempts to provide. This map can help identify where immunizations are offered and by whom, and can provide state and local public health officials with a more complete picture of the current immunization delivery system and its possible deficiencies. The map also can provide insights about which groups of clinics are more likely to offer immunizations in their offices, generating further discussion, hypotheses and studies about the reasons for the overall low or uneven participation in immunization activities of providers in our state, and facilitating the development of interventions. The research activities that are described in this report are a first effort to map Kansas' immunization delivery system for public health policymakers and researchers.

PROJECT OBJECTIVES

The goals of this study are to provide critical information about the childhood immunization infrastructure in Kansas. In particular the study is designed to address the following:

- Identify the number and location of private clinics offering immunization services for children.
- Describe characteristics of private clinics offering immunizations.

- Describe immunization practices in LHDs, particularly the extent to which services are available for all or only some groups of children.

ASSUMPTIONS

There are two important assumptions used in this study:

1. In the private sector in Kansas (and probably in other states as well), immunizations for children are provided in general by primary care physicians (i.e., family physicians, pediatricians and general practitioners), or by other health care staff operating under a primary care physician's supervision (e.g., physician assistant). This assumption is supported by anecdotal evidence, the general knowledge of the study research team about the childhood immunization delivery system in the state, and personal communications from practicing clinicians to the researchers.

2. For the purposes of this study, unless otherwise specified, the unit of analysis is a clinic (private or included in a LHD), rather than individual providers. A private clinic is defined as a location not part of a government-controlled health delivery system where one or more physicians deliver primary care to children. There are several reasons that justify this approach. First, based on the knowledge of the study team (supported by some key informant clinicians), immunization practices (e.g., whether immunizations are offered and to which groups of children) are uniform within each private clinic. That means that all providers in a clinic share the same immunization policies, procedures and practices, and studying those characteristics at the clinic's level is more appropriate and efficient. Second, using a point of delivery (i.e., a clinic) as the unit of analysis is the most appropriate approach to study the availability of immunization services, because it is more directly related to access to the services. For example, if parents in some counties only have one private clinic available to obtain immunizations for their children, that may represent an important access barrier, regardless of the number of providers who may operate in that clinic. This approach was adopted in at least one previously published study (LeBaron, 2002).

METHODS

DATA SOURCES

The design of this study required surveying LHDs and private primary care clinics in the state. KHI received assistance from the Kansas Association of Local Health Departments (KALHD) to identify immunization clinics in local health departments, but a list of private clinics does not exist. The Kansas Board of Healing Arts (BOHA) provided the study team with an electronic list containing information for 7,162 physicians licensed in Kansas as of June 2006. The team then proceeded to generate a list of clinics using the methods described below.

PHYSICIAN LINKAGE DATABASE

From the BOHA list, the study team selected the 1,561 family physicians, pediatricians and general practitioners licensed in the state and matched those that shared common addresses to identify clinics and their locations. The researchers also complemented the information in the BOHA list with information obtained from other public sources, such as insurance providers' databases and Internet search engines, and identified in this way some additional primary care providers that were not in the BOHA list.[2] After these additions to the original BOHA list, the final list of potential target physicians for this study included 1,624 names; of these, 1,549 (95 percent) were assigned to at least one of 643 clinics identified through this process.

PRIVATE CLINIC SURVEY

The research team targeted all 643 clinics to conduct a brief, confidential survey. A draft survey was designed by the study team and reviewed by members of the KHI project staff and providers involved in the IKK project. Feedback from these reviewers was used to create the final version of the survey, which contained 11 questions. A majority of the questions were multiple choice and a few questions allowed the respondents to provide written information as well.

The main goal of the survey was to confirm the identity of private clinics in Kansas that provide immunization services to children ages 0 to 5 in order to gain a better understanding of the factors associated with clinics offering immunization services. Factors included whether insurance coverage plays a role in determining to whom these services are provided, clinic's size and clinic's location within the state. Clinics also were asked to verify the contact information and the number of physicians who provide services in the clinic. The text of the survey for private clinics is in Appendix A.

In July 2006 the project staff mailed the questionnaire along with an introductory letter which was cosigned by representatives of the Kansas Academy of Family Physicians and the Kansas Chapter of the American Academy of Pediatrics, as well as the KHI study director. The introductory letter explained the goals of the IKK project and the purpose of the survey, and offered different ways for a clinic to participate in the study. Each clinic had the option of completing the survey online with the assistance of Survey Monkey® (an interactive survey Web site) or completing the survey by hand and either faxing the form back to KHI or returning it in an enclosed envelope with prepaid postage.

Several steps were taken by KHI staff to encourage participation in the survey. First, a reminder letter was sent to all private clinics approximately two weeks after the first survey mailing. Then approximately a week after the reminder letter was sent, the remaining non-respondents were contacted by the Docking Institute at Fort Hays State University and asked to complete the survey over the telephone. The Docking Institute used a Computer Assisted Telephone Interview (CATI) system that was programmed to ask the same questions as the paper survey.

LOCAL HEALTH DEPARTMENT SURVEY

KHI researchers developed a brief confidential survey to gather information from LHDs in each of the 105 counties in the state. The LHD survey contained six questions, all of which were multiple choice. The survey covered primarily questions about billing practices and the extent to

[2] Physicians might not have been included in the BOHA list because they listed a primary specialty different from family practice, pediatrics or general practice, or because they had moved to the state only recently.

which immunizations were available to all children or only some groups. When appropriate, the survey used questions similar to those used for the private clinics. The survey was conducted in July 2006 in two phases. First, the survey was provided to all LHD representatives that attended training workshops on billing practices that were offered by KALHD. Workshop attendees could fill out the survey by hand and leave it with the workshop facilitators, who sent the completed survey forms back to KHI.

The second phase focused on a follow-up with LHDs that did not attend the KALHD training workshops. The questionnaire was mailed along with an introductory letter, similar to the letter that was sent to the private clinics, which contained an endorsement by KALHD. Each LHD was asked to fax their completed survey form back to KHI. The text of the survey is in Appendix B.

ANALYSIS

Statistical methods — A summary of the statistical methods used in this study is contained in Appendix C.

Classification and grouping — For the private clinics' survey, the inclusion of survey data collected using three different systems (paper, Web survey, and telephone interview) presented some analytical challenges. This section describes the decisions made by the project team in regard to the analysis of the data collected.

Clinic size groups were defined as solo clinics (1 provider), medium-size clinics (2–9 providers) and large clinics (10 or more providers).

Population density was based on county population and size and was classified as follows, based on a modified grouping system widely used in Kansas:

Urban: >=150 people per square mile

Semi-Urban: >=20 and <150 people per square mile

Rural: <20 people per square mile

In addition to population density, levels of immunization services were studied in relation to the number of children ages 0 to 5 years who live in the county.[3] This analysis was done to explore the hypothesis that a private clinic may be more likely to provide immunizations in the presence of an adequate number of children that could justify the clinic's investment in equipment, training, etc. Several thresholds were analyzed and the cutoff point of 600 children or more ages 0 to 5 was chosen. This threshold produced the largest differences between the two groups of counties (i.e., above and below 600 children ages 0 to 5) in levels of immunization services provided.

Paper surveys and the Web survey did not have codes to record the options "Don't know" or "Refused," and they had skip patterns that would cause some questions to remain unanswered based on the answers to previous questions. Telephone surveys were allowed to record "Don't know" or "Refused" values. The decision was made that missing data from paper surveys and from Survey Monkey, and responses coded as 8 ("Don't know") or 9 ("Refused") from the telephone survey were all considered for analytical purposes as non-response items and were not included in the analysis. An exception to this rule was made when the skip pattern allowed for a missing value, i.e., a question could be left blank based on the response to a previous question.

Only clinics that answered "Yes" to the question *"Does your clinic/practice provide primary care to children 0 to 5 years of age?*" were included in the analysis. Clinics that answered "No" or provided responses with missing values or (for the telephone interview) with values of "Don't know" or "Refused" were considered not eligible for inclusion in the study. Additionally, a few clinics were not included for technical reasons (e.g., wrong phone number), as described in the result section.

Clinics were grouped based on the level of immunization services that they provide. There were three questions (3, 4 and 5) regarding whether the clinic offers immunization services to children, and if so, whether it does so for all children or only some groups (based on insurance status). Question number 3 asked whether a clinic offers immunization services or not. Question number 4 asked whether the clinics offers immunizations to all or only some groups of children.

[3] Source: U.S. Census Bureau, 2000 Census.

Question number 5 had a list of groups of children (based on insurance status) and check boxes to mark one or more groups in the list.[4] The groups included privately insured, uninsured, Healthwave/State Children Health Insurance Program (SCHIP), Tricare/Military insurance, and Vaccines for Children (VFC).[5]

Although a skip pattern was in place to avoid inconsistencies (e.g., the clinic reporting that they offer immunizations to all children but checking only a few insurance group options), in practice several responses received did not follow the skip pattern that was recommended. The project team developed an algorithm that allowed classification of all responses into four groups (Figure 1):

1) practices that offer immunizations to all children;
2) practices that offer immunizations to some children;
3) practices that do not offer immunizations at all; and,
4) don't know.[6]

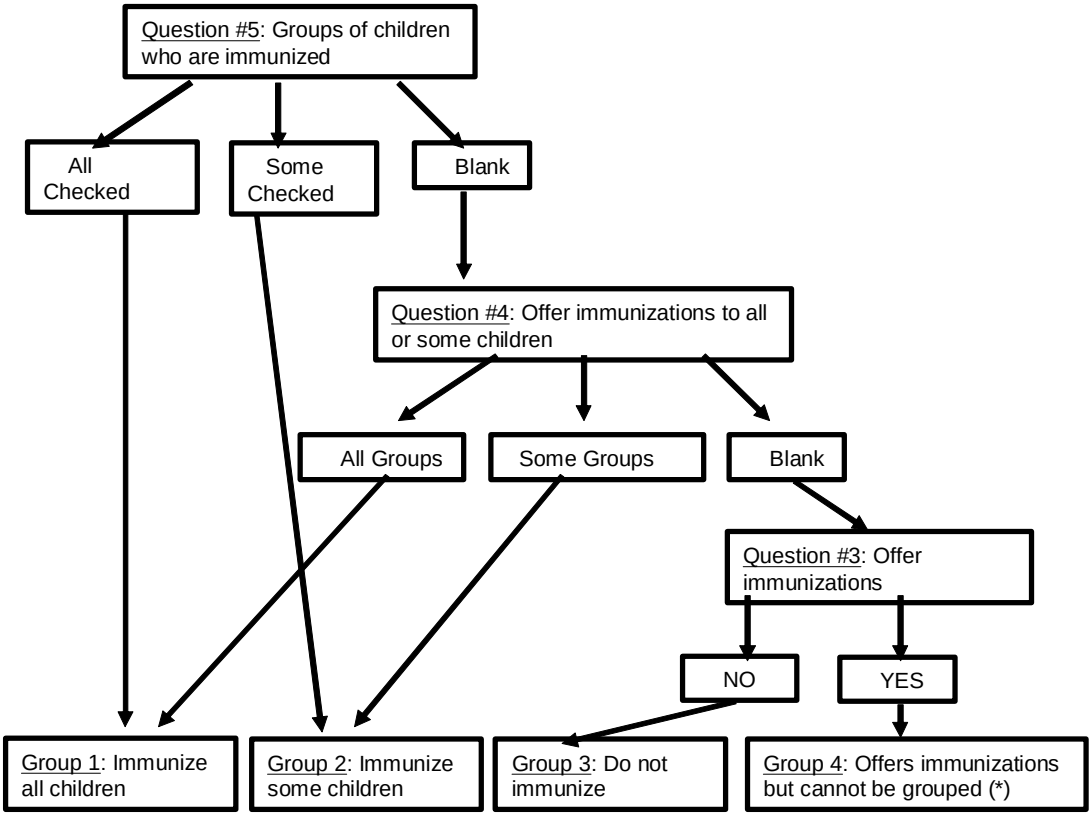
The three questions were considered in a hierarchical manner, with answers to question number 5 taking priority over answers to question number 4, which in turn took priority over answers to question number 3. The detailed decision tree is shown in Figure 1.

[4] One of the options offered in question number 5 was "Illegal/undeclared immigrants." This option was left unchecked by the vast majority of the respondents, probably out of concerns for legal liability if the clinic admits to knowingly providing services to illegal aliens. Anecdotal information indicates that most clinics do not select their patients based on their immigration status. Therefore this option was not included in the analysis because the answers were deemed unreliable.

[5] Vaccine for Children (VFC) is a federally funded program that supplies free vaccines to children who are uninsured, underinsured, Medicaid-eligible, or American Indians/Alaska Natives. Details about VFC eligibility are available on the CDC Web site at http://www.cdc.gov/programs/immun10.htm.

[6] Clinics in this group would be excluded from any further analysis dealing with the provision of immunization services. In practice, no clinics were classified in this group.

Figure 1. **Criteria Used to Classify Private Clinics by Level of Immunization Services, Kansas, 2006**



* No clinics were classsified in group 4.

The LHDs' questionnaires were analyzed using similar techniques as the clinics' questionnaires. Since all the LHDs were considered eligible for the study, and all of them provide immunization services, the analysis of this information did not present the same challenges found for the analysis of the private clinics surveys.

RESULTS

CLASSIFICATION OF THE PARTICIPATING CLINICS AND RESPONSE RATES

Private clinics — A total of 643 private clinics were contacted and invited to participate in the study. Only private clinics that reported offering primary care services to children ages 0 to 5 years were considered eligible to participate in the study. Of the original 643 private clinics, 479 (74.5 percent) were found to be eligible, and 164 (25.5 percent) were excluded from the study. More than three quarters of the excluded clinics (129 of 164, or 78.7 percent) were considered non-eligible clinics, and 35 (21.3 percent) could not be reached because of technical difficulties (e.g., wrong address or phone number). These 35 records (representing 5.4 percent of all 643 clinics originally targeted with the survey) were not included in the study, since the existence of these clinics could not be verified.[7] The initial mailing, the reminder mailing, and the telephone follow up yielded 424 completed surveys, representing a response rate of 88.5 percent of the 479 eligible clinics (Table 1). The response rate was slightly lower for urban counties (82.5 percent) and for large clinics (80.0 percent) than for the whole state. Forty-four percent of the surveys were collected using the telephone interview method. That percentage was slightly higher for private clinics located in urban counties (42.2 percent) than for those located in semi-urban and rural counties (35.8 and 21.9 percent, respectively), but these differences were not statistically significant. There was no difference in the distribution of the main characteristics being studied (e.g., provision of immunizations) based on the method chosen by the clinics to participate.

Table 1. **Study Population of Private Clinics, Kansas, 2006**

	Number of Clinics N	Percent of Clinics %
Total Clinics Contacted	643	100
Total Ineligible Clinics	164	25.5
Not Primary Care Clinic for Children 0 to 5	*129*	*78.7*
Technical Problems	*35*	*21.3*
Total Eligible Clinics	479	74.5
Refused	*55*	*11.5*
Successfully Completed Survey (response rate)	***424***	***88.5***

[7] Given that the survey targeted potential primary care clinics identified through linkage techniques and multiple directories, it is likely that the original list had some duplications and inaccuracies (e.g., clinics moved to a different address, changes in clinics' names, clinics no longer in existence, etc.)

Local Health Departments — Local Health Department clinics in all 105 counties were considered eligible for inclusion in the study and contacted. Sixty-three (60.0 percent) LHDs received questionnaires at the KALHD training workshops, and all of them completed and returned them. The 42 (40.0 percent) LHDs that did not receive the survey at the KALHD workshops received the questionnaire and information about the survey by mail. The KALHD workshops and the KHI mailing yielded 97 completed surveys, representing an overall response rate for LHDs of 92.3 percent. Of the eight LHDs that did not respond, six were in rural and two in semi-urban counties.

THE PEDIATRIC PRIMARY CARE SYSTEM IN THE STATE

The first question on the private clinics' survey asked whether the clinic provided primary care services to children ages 0 to 5 years, allowing this study to provide a description of some basic characteristics of the private pediatric primary care system in the state.[8] Of the 424 participating primary care private clinics, over one third are individual provider (solo) practices (Table 2). Medium-size clinics, the largest group, account for over half of all the clinics. Not surprisingly, clinics in rural counties account only for a little more than one quarter of all private clinics, with the remaining clinics roughly evenly distributed among semi-urban and urban counties. While the five counties classified as urban (Wyandotte, Johnson, Douglas, Shawnee and Sedgwick) include about half of the population in the state, they account for 156 of 424 (36.8 percent) of all private clinics in the state. Over one third (36.1 percent) of private clinics reported some form of affiliation with other structures, such as hospitals or clinical networks. Appendix D includes county-by-county information on the distribution of private primary care clinics and some selected characteristics.

[8] Since typically LHDs in Kansas only provide a few, selected primary care services to children, this question was not asked in the LHD survey. Also, some safety network clinics throughout the state may provide primary care services to children, but they are few in number and were not included in this study.

Table 2. **Private Clinics by Selected Characteristics, Kansas, 2006**

Selected Characteristics	Number of Clinics N	Percent of Clinics %
Clinic Size		
Solo Practice (1 physician)	168	39.6
Medium Practice (2–9 physicians)	228	53.8
Large Practice (>=10 physicians)	28	6.6
Total	424	100.0
County Population Density Groups		
Located in a Urban County	156	36.8
Located in a Semi-Urban County	151	35.6
Located in a Rural County	117	27.6
Total	424	100.0
Clinic Affiliation		
Practice Network	13	3.1
Practice Association	47	11.1
Hospital Owned	93	21.9
No Affiliation Reported	271	63.9
Total	424	100.0

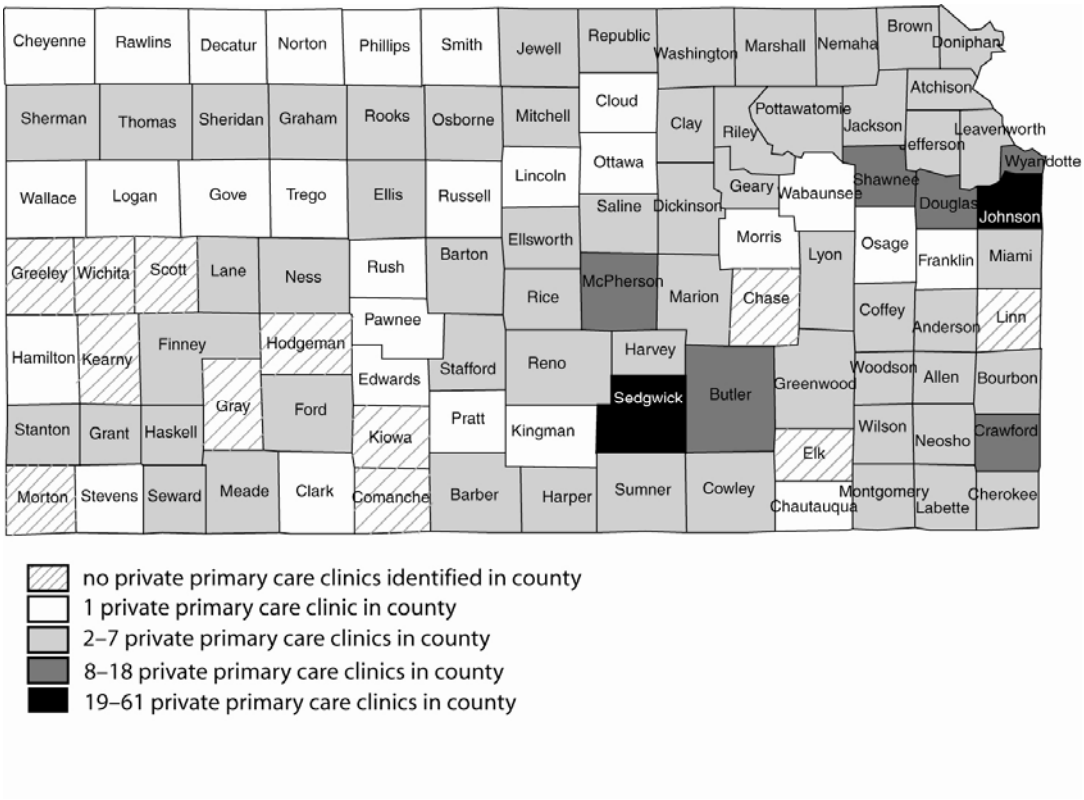
Solo and medium-size private clinics are about evenly distributed across all three population density groups, and large clinics are found very rarely in rural counties (Table 3). Solo clinics represent a larger share of all private clinics in rural counties than in other counties, but it should be noted that even in urban counties solo clinics represent over one third of all private clinics. None of these differences are statistically significant (Pearson chi square, p=0.18), possibly because of the small number of observations in some of the cells in the large clinics group.

Table 3. **Private Clinic Size by County Population Density, Kansas, 2006**

	COUNTY POPULATION DENSITY							
	Urban		*Semi-Urban*		*Rural*		*Total*	
Clinic Size	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Solo	54	34.6	63	41.7	51	43.6	168	39.6
Medium	89	57.1	76	50.3	63	53.8	228	53.8
Large	13	8.3	12	8.0	3	2.6	28	6.6
Total	156	100.0	151	100.0	117	100.0	424	100.0

The survey was able to identify at least one private primary care clinic in 93 (88.6 percent) of the 105 counties in the state. In 12 (11.4 percent) counties, all rural and concentrated in the southeast and southwest portions of the state, no private clinic was identified (Figure 2).[9]

Figure 2. **Number of Private Primary Care Clinics by County (2006)**



THE IMMUNIZATION DELIVERY SYSTEM IN THE STATE

1) Availability of immunization services in LHD clinics

All LHDs offer some level of immunization services, since they are all VFC providers. Of the 97 LHDs that responded to the survey, 69 (71.1 percent) provide immunizations to all children and 91 (93.8 percent) have mechanisms in place to bill insurance for the immunizations that they provide. Just about half (50.5 percent) of the LHDs can bill all insurance companies, and 71 (73.2 percent) can bill Blue Cross and Blue Shield (the most common insurance carrier in

[9] To validate this finding the study team performed a quick, informal telephone follow-up with the LHDs in the 12 counties with no primary care clinic. LHDs staff reported that there is at least one private clinic available for children in all but one county, but often no physician is present on a regular basis and the services offered are limited (very rarely including immunizations). For the purpose of this study, these 12 counties are classified as missing a private primary care clinic for children ages 0-5.

the state). Thirty-four (35.0 percent) LHDs reported having an official sliding fee scale for immunization services.[10]

2) Availability of immunization services in private clinics

Number and geographical distribution of private clinics providing immunization services — Of the 424 private clinics included in the analysis, 147 (34.7 percent) do not offer any immunization services to children, and 277 (65.3 percent) provide immunizations to at least some groups of children. These 277 private clinics include 126 that offer immunizations to all pediatric patients, regardless of their insurance status, and 151 that offer immunizations only to selected groups of children. Groups more often accepted to receive immunizations in private clinics are privately insured children and children insured through the military (Table 4). Less than 60 percent of the clinics that offer immunizations provide services to Medicaid or SCHIP clients.

Table 4. **Private Clinics Offering Immunizations by Groups Accepted*, Kansas, 2006**

	Number of Clinics	Percent of Clinics
Offer Immunizations to:	**N**	**%**
Privately Insured Children	265	95.7
Uninsured Children	231	83.4
Medicaid Children	161	58.1
Healthwave/SCHIP Children	162	58.5
Tricare/Military-Insured Children	225	81.2
Total	277	100.0

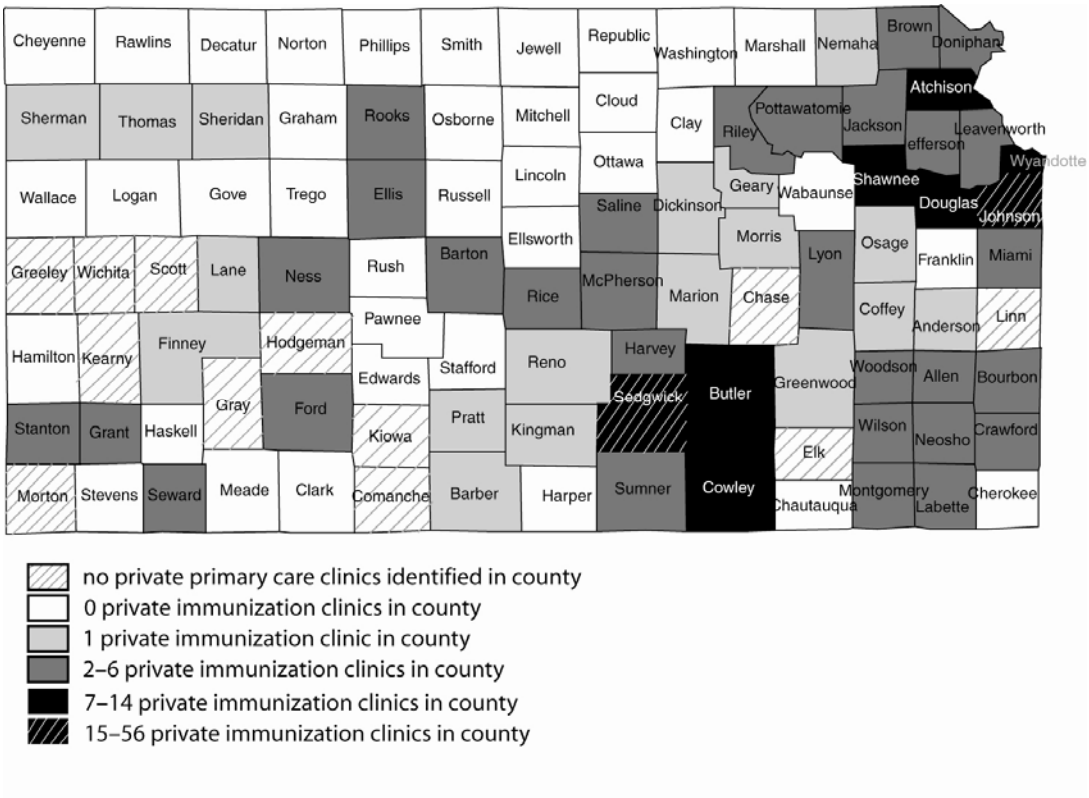
* Clinics could select multiple options. In 126 clinics immunizations are offered to all groups.

The total number of counties with no private primary care clinic offering immunization services is 49 (46.7 percent), 47 of which are classified as rural (Figure 3). This number includes the 12 counties where no private primary care clinic was identified, and an additional 37 counties where one or more private clinics exist that could provide immunizations, but do not do so.

[10] Some local health departments report anecdotally that even though they may not have an official sliding fee scale, in practice they provide service to clients unable to pay and may accept payments lower than the regular charges. These situations were not documented in the survey used for this study.

Many of the counties where at least one private clinic, but no clinic providing immunizations, was identified were located in the northern and north-central portion of the state.

Figure 3. **Number of Private Immunization Clinics by County (2006)**



Effects of county population density and size — There is a direct association between level of immunization services provided in private clinics and county population density (Table 5), and these differences are statistically significant (Pearson chi square, p=0.001). **The proportion of private primary care clinics offering immunizations to some or all children decreases progressively moving from urban to rural counties.** The odds ratio of providing immunizations is 5.5 for clinics in semi-urban counties and 15.9 for clinics in urban counties, relative to clinics in rural counties.

Table 5. **Level of Immunization Services Provided in Private Clinics by County Population Density, Kansas, 2006**

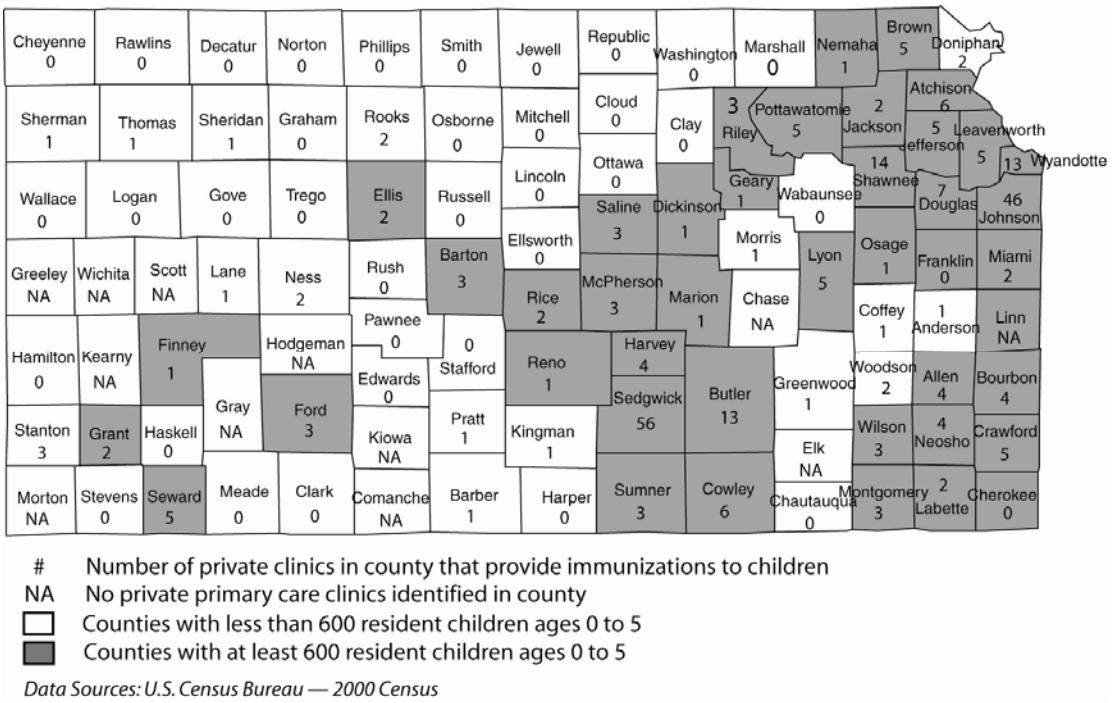
	COUNTY POPULATION DENSITY							
	Urban		*Semi-Urban*		*Rural*		*Total*	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services	136	87.2	106	70.2	35	29.9	277	65.3
Do not offer immunization services	20	12.8	45	29.8	82	70.1	147	34.7
Total	156	100.0	151	100.0	117	100.0	424	100.0

In addition to population density, levels of immunization services provided in private clinics were studied in relation to the number of children 0 to 5 years old who live in the county. **Private clinics located in counties with 600 or more children ages 0 to 5 are more likely to provide immunization services (Table 6 and Figure 4), and these differences are statistically significant (Pearson chi square, p=0.001).** The odds of being a clinic that offers immunization services are 12.1 times greater in counties with 600 or more children compared to counties that have fewer than 600 children.

Table 6. **Level of Immunization Services by Number of Children Ages 0 to 5, Kansas, 2006**

	NUMBER OF CHILDREN IN COUNTY					
	< 600 children		**>= 600 children**		***Total***	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services	22	22.7	255	78.0	277	65.3
Do not offer immunization services	75	77.3	72	22.0	147	34.7
Total	97	100.0	327	100.0	424	100.0

Figure 4. **Number of Private Clinics that Provide Immunizations to Children by County and by Number of Resident Children Ages 0 to 5 Years (2006)**



An attempt was made to understand the independent effect of county population density and number of children resident in the county on the level of immunization services provided by private clinics. The results show that both a higher county pediatric population size and higher population density appear to be associated with private clinics that provide immunization services, and these two characteristics interact with each other in complex ways. In brief, the effect of number of children ages 0 to 5 resident in the county, after adjusting for county population density, remains strong, even in rural counties (i.e., rural private clinics that provide immunization services are more likely to be located in counties with 600 or more children ages 0 to 5). The details of this analysis are presented in Appendix E.

Effects of practice size — Large and medium size clinics are more likely than small clinics to offer immunization services, and that difference is statistically significant (Pearson chi square,

p=0.007) (Table 7). The odds of being a clinic that offers immunization services are 2.0 times greater in medium-size clinics and 3.0 times greater in large clinics compared to solo clinics.[11]

Table 7. **Level of Immunization Services in Private Clinics by Clinic Size, Kansas, 2006**

	CLINIC SIZE							
	Solo		*Medium*		*Large*		*Total*	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services to all or some children	93	55.4	162	71.0	22	78.6	277	65.3
Do not offer immunization services	75	44.6	66	29.0	6	21.4	147	34.7
Total	168	100.0	228	100.0	28	100.0	424	100.0

VFC providers — As mentioned above, all LHDs are enrolled in the VFC program.[12] Among private clinics, 141 (50.9 percent) of 277 clinics that offer some level of immunization services are also enrolled in the VFC program.

There are more VFC providers in urban and semi-urban counties, but the proportion of private clinics offering immunizations that are enrolled in the VFC program is higher in rural counties (Table 8). Less than 40 percent of private clinics that provide immunizations are enrolled in VFC in urban counties, but that proportion increases in semi-urban and rural counties, and these differences are statistically significant (Pearson chi square, p=0.006). Solo practices also have a slightly higher proportion of VFC providers than medium and large practices, but these differences are not statistically significant.

[11] Since clinic size is related to population density (as shown in Table 4), the effect of clinic size was studied for each of the population density groups through a stratified analysis. However, given the small number of observations in some of the cells, no conclusion could be drawn.
[12] Details about VFC eligibility are available on the CDC Web site at http://www.cdc.gov/programs/immun10.htm.

Table 8. **Private Clinics That Provide Immunizations and are Enrolled in the Vaccines For Children Program by County Population Density, Kansas, 2006**

	COUNTY POPULATION DENSITY							
	Urban		*Semi-Urban*		*Rural*		*Total*	
VFC Provider Status	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
VFC Clinic	54	39.7	61	57.6	26	74.3	141	50.9
Not VFC Clinic/Don't Know/Not Reported	82	60.3	45	42.4	9	25.7	136	49.1
Total	136	100.0	106	100.0	35	100.0	277	100.0

Among private clinics, VFC providers are much more likely to provide immunizations to all children compared with non-VFC providers (Table 9), and that difference is statistically significant (Pearson chi square, p=0.001).

Table 9. **Level of Immunization Services Provided in Private Clinics by VFC Status, Kansas, 2006**

	VFC PROVIDER							
	Yes		*No*		*Don't know/ not reported*		*Total*	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services to all children	108	85.8	9	7.1	9	7.1	126	100.0
Offer immunization services to some children	33	21.9	96	63.6	22	14.6	151	100.0
Total	141	50.9	105	37.9	31	11.2	277	100.0

Distribution of private providers — Although one of the main purposes of this study was to count and describe private clinics (i.e., points of service) and not individual physicians who practice in those clinics, the project team also performed some limited analyses using the information collected that centered on the distribution of individual physicians, their specialties, and whether they provide immunizations. A total of 1,153 physicians operating in the 424 private clinics included in this study were identified. The average number of physicians per clinic is 2.7, ranging from 3.4 in urban counties to 2.1 in rural counties. About one third (32.8 percent) of physicians practice in semi-urban areas, 46.4 percent practice in urban areas, and 20.8 percent in rural areas. Compared to the distribution of clinics (shown in Table 2), a slightly higher

proportion of physicians than clinics are concentrated in urban areas. The load of patients ages 0 to 5 for each physician ranges from 37 patients per physician in urban counties to 19 in rural counties, with the state average being 33. Appendix D has more detailed county-level information on the distribution of primary care physicians.

Of the 1,153 physicians, 888 (77.0 percent) are family physicians (Table 10). Over 95 percent of pediatricians (all but nine) practice in private clinics that provide immunizations, while 74.2 percent of family physicians do so. These numbers should be interpreted with caution, though, because they could be confounded by other factors. For example, 94.7 percent of pediatricians practice in clinics located in urban or semi-urban areas (where clinics more often offer immunization services), compared to 75.6 percent of physicians in other specialties.

Table 10. **Physicians Practicing in 424 Private Primary Care Clinics by Specialty, Kansas, 2006**

Practices in a clinic that provides immunizations	SPECIALTY									
	General Practice		*Family Medicine*		*Pediatrics*		*Unknown*		*Total*	
	N	%	N	%	N	%	N	%	N	%
Yes	18	36.0	659	74.2	199	95.7	6	85.7	882	76.5
No	32	64.0	229	25.8	9	4.3	1	14.3	271	23.5
Total	50	100.0	888	100.0	208	100.0	7	100.0	1153	100.0

DISCUSSION

There are four main issues raised by this study that will be discussed in this section of the report:

1) Are there an adequate number of private clinics in Kansas to meet the needs of children for primary care services?
2) Are there an adequate number of clinics (private or public) in Kansas to meet the needs of children for immunization services?
3) What are the main factors that are associated with the provision of immunization services in private clinics?
4) Would increasing participation of private clinics in immunization activities increase immunization rates in the state?

1) Are there an adequate number of private clinics in Kansas to meet the needs of children for primary care services? — Although this study was not intended to draw firm conclusions on whether a shortage of primary care providers for the pediatric population exists in the state, addressing this question is an essential, preliminary step to understand the characteristics and possible limitations of the state's immunization delivery system. In 12 counties the research team was unable to identify any primary care clinic serving children. Slightly over one third of primary care clinics identified are located in urban counties, where about half of the state population lives. Therefore clinics in urban counties have to serve a higher number of children ages 0 to 5 per clinic (146) than those in semi-urban or rural counties (126 and 131, respectively). The higher ratio of children to clinic in urban counties can be compensated in part by the higher number of physicians working in each clinic, but even after taking this factor into account, physicians in urban counties must support, on average, a higher number of children ages 0 to 5 than those in semi-urban and rural counties. The smaller ratio of children-to-clinic and children-to-physician in non-urban counties, however, is likely offset by other barriers to access, such as the distance that children and their parents have to travel to reach a clinic or lower insurance coverage rates. This study could not assess those potential barriers.

2) Are there an adequate number of clinics (private or public) in Kansas to meet the needs of children for immunization services? — This study identified 277 private clinics throughout the state that provide immunizations to at least some children. There is a number of private primary care clinics that do not provide immunization services. Over one third of the primary care clinics identified in this study do not provide immunization services, and over 70 percent of these clinics are located in less populated areas. Only in the five most populated counties (classified as urban counties in this study) does the proportion of private primary care clinics that offer immunizations exceed 80 percent. In 49 counties (all but two classified as rural), representing almost half of Kansas' counties, there is either no private primary care clinic at all, or none of the private clinics offers immunizations to children.

The number of private immunization clinics identified in this study is consistent with the findings from a study published in 2002 that estimated (from multiple data sources) that in 1997 there were 230 private sites that provided immunizations in Kansas (LeBaron, 2002). Based on those numbers, the proportion of total vaccination sites in the private sector in Kansas was 59 percent, in contrast with a national average of 81 percent. In 1997, Kansas ranked among the lowest seven states in the country for private share of vaccination activities, measured both by the percentage of immunization clinics that are private and by the proportion of children that receive all their immunizations from private providers.

In addition to private clinics, public clinics represent another important component of the immunization delivery system. The 2002 study estimated that in 1997, 157 sites classified in that study as public provided immunizations in Kansas, including local health departments, community health centers, military clinics, etc. The study presented in this report was not aimed at counting clinics outside of the private sector, and therefore cannot be used to update all the numbers from the 2002 study. However, if we use the current count of 277 private clinics and the 1997 estimated count of 157 non-private clinics that offer immunizations in the state, the share of private clinics in Kansas increases from 59 percent to 64 percent of all 434 private and non-private clinics providing immunizations, still considerably lower than the 1997 national average

of 81 percent.[13] In 1997 there was a ratio of 94 infants for each private clinic in the country. The same ratio for Kansas in 2006, assuming the presence of 277 private immunization clinics, is considerably higher, at 141 infants per private clinic. When all immunization clinics (public and private) are considered, the difference between Kansas and the rest of the country is reduced, but remains substantial, with an average of 76 infants in the U.S. (in 1997) and 90 in Kansas (in 2006) for each clinic, representing a ratio about 20 percent higher in Kansas than in the U.S.

While the authors of the 2002 study stop short of setting national goals for an infants-to-clinic ratio, they did conclude that capacity at the national level did not seem to be a rate-limiting factor to achieve immunization coverage goals, *provided that other barriers to access were not present*. It is unclear whether the lower capacity in Kansas (compared to the rest of the country) can be considered as adequate. What is clear from our results, though, is that some other access barriers remain in Kansas, most noticeably:

- more than half of private immunization clinics only accept clients with selected health insurance coverage;
- almost half of private immunization clinics are not enrolled in the VFC program, and that number is higher than 60 percent in urban counties (the national average for VFC enrollment reported in 1997 was 81 percent of private clinics providing immunizations);
- almost two thirds of LHDs do not have an official sliding fee scale (although some may offer discounts on a case-by-case basis); and
- more than one in four local health departments are not currently billing Blue Cross and Blue Shield, with the results that children who do not qualify for the VFC program may either be unable to receive their vaccinations at the LHD or may incur out-of-pocket charges.

In addition, other barriers may also exist that could not be examined in our study, such as limited immunization schedules in some local health departments or the distance that clients have to travel to reach the nearest clinic where immunizations are offered. In a review of

[13] Given the trend in the country since 1997 of having children immunized in their medical home, it is likely that the current national share of private immunization providers is actually higher than the 1997 value.

published evidence, in 2000 the U.S. Task Force on Community Preventive Services recommended improving access to immunizations as one of the strategies likely to be successful in improving immunization rates, when used in conjunction with other interventions (Task Force on Community Preventive Services, 2000). Examples of interventions cited by the Task Force include decreasing the distance between the setting and the population, increasing the hours during which vaccination services are provided, delivering vaccinations where they were not previously provided (e.g., emergency departments, inpatient units, or sub-specialty clinics), or reducing administrative barriers to obtaining vaccination services within clinics (e.g., developing a "drop-in" clinic or an "express lane" vaccination service).

In summary, these findings suggest that important barriers to access to immunizations remain in Kansas. Participation of private clinics in immunization activities is lower in Kansas than in most other states, and this low participation is only partially offset by a proportionally higher number of public vaccination sites (i.e., local health departments). The presence of other barriers to access, such as restrictive insurance billing practices, limited schedules and distance that clients have to travel to reach an immunization clinic, may further decrease the availability of childhood immunization services.

3) What are the main factors that are associated with the provision of immunization services in private clinics? — Several characteristics of private clinics were found to be associated with the provision of immunization services, in particular: the size of the clinic (measured through the number of physicians who work there); the population density of the county in which the clinic is located; and the number of children ages 0 to 5 who live in the county. Some of these characteristics are related to each other, and their independent effect is difficult to ascertain. The effect of population size is particularly noticeable, even in rural counties. From the results of this analysis, therefore, it appears that the number of children ages 0 to 5 living in the county where the clinic is located has probably the strongest association with whether private clinics provide immunizations or not. This could be explained by the fact that there are start-up and overhead costs involved in a clinic's decision to provide immunizations to children. In the absence of a "critical mass" of clients eligible to receive the service, many practices may simply decide to forego that activity.

In addition to the factors measured through this survey, there are others that are likely to play a role in the decision of a clinic to provide immunizations and may be difficult to capture through a structured questionnaire. Some of these factors may include the opinion on the part of providers that reimbursement for immunizations are insufficient; excessive bureaucratic burden exists, particularly in government programs like VFC; there is reluctance to change long-established practices; and others. A qualitative study is in progress, involving both some clinics that do and some that do not provide immunizations, to try to identify some of the factors involved in the decision of providing immunizations. The new study may be helpful also in explaining why private clinics in Kansas are less engaged in immunization activities than those in most of the other states.

4) Would increasing participation of private clinics in immunization activities increase immunization rates in the state? — This question will be the object of a separate study to be implemented in the first half of 2007. Some information is already available, however, to assist in defining this issue, and this study can contribute to that body of knowledge. For example, the retrospective immunization survey conducted in Kansas for 2004–2005 identified 35 counties that had at least 80 percent of children who had completed the 4:3:1:3:3 series by 24 months of age. All but four of the 35 counties were in areas classified in this study as rural, with estimated populations of less than 10,000 persons. None of the five urban counties (Douglas, Johnson, Sedgwick, Shawnee, and Wyandotte) had at least 80 percent coverage for the 4:3:1:3:3 series. Of the 49 counties identified in this study with no private immunization clinics, 23 (47.0 percent) were in the group with at least 80 percent of coverage rate, compared to 12 (21.4 percent) of the 56 counties with one or more private immunization clinics.

In another survey, the 2004 Clinic Assessment Software Application (CASA)[14] assessment of LHDs identified 39 counties with coverage for 4:3:1:3:3 of 90 percent or more. Of the 49 counties with no private immunization clinics, 27 (55.1 percent) were included in the 90 percent group, compared to 22 (34.3 percent) of the 56 counties with at least one private immunization clinic. These results are consistent with those from previous retrospective surveys and from

[14] CASA is an assessment of immunization coverage rates of clients in a clinic. It has been performed for many years in all LHDs in Kansas.

CASA clinics assessments, in which rural counties tend to outperform urban counties for immunization coverage rates. The CASA results are particularly interesting, since CASA assessments reflect more directly the performance of single clinics (in this case LHDs), rather than the coverage rate for all children in a county. These numbers suggest that in the majority of counties without a private immunization clinic or with few clinics, LHDs are able to effectively handle the immunizations of the children that are referred to them by other providers.

A heavy reliance on public clinics for the provision of immunization services can also have some negative effects. For example, a study published in 2006 (Santibanez, 2006) found that during a shortage of diphtheria-tetanus-acellular pertussis (DTaP) vaccine in 2001 and 2002, children in the United States who were immunized only in public clinics affected by the shortage had a significantly lower coverage rate than those immunized in private clinics similarly affected (59.4 percent and 67.7 percent, respectively). The authors concluded that "…the recent DTaP shortage resulted in a differential delay in receipt of the fourth dose of DTaP among children vaccinated only at public clinics, with no similar pattern found among children vaccinated only at private practices or other practice types…" This could explain at least in part why Kansas, a state that relies on public health departments to provide immunizations more heavily than other states, experienced a drop in immunization rates during the vaccine shortage greater than other states did.[15]

Limitations of this study — One of the limitations of this study is that it relied on the information in the linkage database that was developed immediately prior to the study. While efforts were put in place to assure the completeness of that database, it is possible that some clinics were missed. The number of clinics identified is consistent with figures published in previous papers, suggesting that the number of clinics that were missed is probably low. Also, the information collected was all self-reported, and no validation took place, introducing the possibility of inaccuracies or biases in the reported information. In addition, safety-network clinics were not included in this survey. These clinics are few in number, however, and they often refer their clients to LHDs for immunizations. Finally, the multiple collection methods

used in the study (i.e., mail, fax, and telephone-assisted survey) may have introduced some bias in the responses provided by groups that used different methods to participate in the survey, although the break down of the results by method of collection did not show any evidence of such bias.

[15] Some researchers and organizations (including the American Academy of Pediatrics) strongly recommend that immunizations should be given in a child's medical home, for several reasons besides assurance of timely vaccinations. These other reasons were not within the scope of this project and are not considered in this discussion.

CONCLUSIONS

This study represents the first attempt to count and locate all private immunization sites in Kansas and to describe some of their characteristics. This study confirmed the notion that private clinics in Kansas are less likely to provide immunization services than private clinics in the rest of the United States. This idea has been suggested in the past by a few national studies (for which state-level information was scanty) and by anecdotal evidence. This notion also has led some to wonder to what extent the instability of immunization coverage rates in Kansas (which has positioned in some years the state at the bottom of immunization coverage rankings) may be explained by the relative low proportion of private clinics that provide immunization services in this state. The results of this study do not fully support that concept. In rural counties, where our study found fewer private clinics that provide immunizations, immunization rates tend to be higher than in more populated counties with a more balanced mix of private and public providers. While this suggests that other factors besides the number of private clinics ultimately affect the immunization rates in the state, it does not fully negate the potential benefits towards timely immunization of children that the state could realize from a more balanced distribution between private and public resources.

This information can assist in addressing some important questions: Should efforts be made to increase private clinics' participation in immunization programs? If so, which clinics should be targeted? What other actions could be undertaken to improve and sustain the state's immunization rates? Based on the findings of the study, as well as additional published and unpublished information described in this report, the following options could be considered:

1. Remove any possible barriers to the timely delivery of immunizations. Some of the initiatives to be considered include efforts to recruit more VFC providers among private clinics that already immunize their children and expansion of the number of clinics, both private and public, that offer immunizations to all children, regardless of their insurance status.

   Rationale: The ratio of children to clinics in Kansas is higher than in other states (LeBaron, 2002). While the current immunization delivery system may be sufficient to meet the demand for immunizations under normal circumstances for most of the children,

the presence of additional barriers to access may represent a tipping point in the system that could keep children in some areas or under some circumstances from receiving timely immunizations (Task Force on Community Preventive Services, 2000). In particular, VFC enrollment in Kansas is considerably lower than in other states, particularly in urban areas, which may put children in the VFC target groups (who may have few other options for receiving their vaccinations) at risk of delays in getting their immunizations (Smith, 2005).

2. Continue to examine the issue of low participation of private providers in Kansas in immunization activities.
   Rationale: Compared to other states, Kansas private providers and clinics are less inclined to provide immunizations and to enroll in the VFC program. Although in many cases it appears that local health departments, particularly in less populated areas, are able to cope with the children referred by private clinics, this unbalanced share may weaken the overall immunization delivery system in the state. Efforts should be made to gain additional understanding of the reasons that prevent private clinics from providing immunizations, as well as the impact on the delivery of timely immunizations of the low participation of private clinics in immunization programs. Improving immunization rates in semi-urban and urban counties (where the rates are currently lower than in rural counties) is likely to require a higher level of participation of private clinics in immunization activities. Without more participation from private clinics, LHDs in semi-urban and urban areas would require a large increase in resources to assure timely immunizations to the children in their county, which is probably not feasible. In addition, there is evidence that providing immunizations in a child's medical home improves immunization rates (Smith, 2005), and LHDs in Kansas can rarely act as full medical homes for their clients. While LHDs in rural counties may be able to overcome this disadvantage, those in more populated counties may need more support from private clinics to assure timely immunizations of the children in the county.

3. When trying to recruit more private clinics for immunization activities or to minimize access barriers, focus efforts primarily on clinics in urban and semi-urban areas and in

counties with at least 600 children ages 0 to 5 (see Appendix D for a county-by-county list).

Rationale: This option may appear counter-intuitive, given that our study found that currently a smaller proportion of private clinics offer immunizations in rural counties than in more populated counties. It would appear, therefore, that efforts should be concentrated where participation is proportionally the lowest (i.e., rural areas). The following factors, however, suggest that focusing on clinics located in semi-urban and urban counties may be overall more effective in raising the state's immunization rates:

a. Private clinics in more populated counties, particularly those with 600 or more children ages 0 to 5, are more likely to offer immunizations, but sparsely populated counties tend to have immunization rates that exceed those of other counties. Therefore the need for additional interventions and improvement is greater in larger counties.

b. Even small improvements in immunization rates in more populated counties may have a large effect on the state's overall rate, given that the majority of the state's population lives in those counties.

c. The VFC participation rate is particularly poor in urban counties, where only 40 percent of private clinics offering immunizations participate. That leaves a large number of clinics in semi-urban and urban areas that could be recruited into the program, which in turn could result in improved access to immunizations, especially for clients whose lower socioeconomic status puts them at risk of delays in receiving immunizations.

4. In areas where private clinics are associated in practice networks including multiple clinics, efforts to recruit more private clinics for immunization services and to remove barriers to access should focus on networks, rather than individual clinics.

   Rationale: Over one third of the primary care clinics are associated with hospitals or are part of larger networks. In these cases the decision of whether to offer immunization services or to enroll in programs like VFC is often made at the central administrative level for all the clinics in the network. As a result, a successful marketing effort aimed at

the central level of the network will result in the recruitment of all the clinics in the network, which may make these efforts more cost-effective.

It is important that the options presented above be considered in the context of broader strategies and plans addressing the whole spectrum of issues that affect immunization rates in the state. Financial barriers, vaccine availability, community involvement, support from state leaders inside and outside government, local relations between private and public providers, all play an important role in determining whether a child receives all the required immunizations on time. This report hopefully represents a helpful tool to assist policymakers in some of these complex decisions.

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APPENDIX A

Private Clinic Survey

IMMUNIZE KANSAS KIDS

IMMUNIZE KANSAS KIDS CLINIC QUESTIONNAIRE

The following survey is part of the Immunize Kansas Kids initiative. More information concerning the project is available online at www.immunizekansaskids.org.

As an alternative, the survey may be completed online at:
http://www.surveymonkey.com/s.asp?u=497202506963.

All information you provide is confidential, and no clinic's individual response will be reported. The information will be tabulated into group level responses and a summary report of the findings from this survey will be available in the future on the Immunize Kansas Kids Web site.

If you choose to complete the survey via this mailing rather than online, please mail or fax completed survey to:

Immunize Kansas Kids — KHI
212 SW Eighth Avenue, Suite 300
Topeka, KS 66603-3936
FAX (785) 233-1168

In the event that we do not receive your response, we may contact you via telephone.

Please contact Sunee Mickle at (785) 233-5443 if you have any questions. Thank you!

1. Please change or complete your clinic/practice's information as necessary:

Clinic Name: «cliname»

Address: «Street1»

Address Line 2: «Street2»

City: «City» Zip: «Zip» County: «County»

Telephone: «Telephone1»

Contact Person:_____ E-mail: _____

Best time to be contacted by phone: AM PM

2. Does your clinic/practice provide primary care to children 0 to 5 years of age?

[Circle response letter]

A. Yes If "Yes," continue to Question #3.
B. No If "No," continue to Question #11.

3. Does your clinic/practice offer immunization services to children 0 to 5 years of age?
[Circle response letter]

A. Yes If "Yes," continue to Question #4.
B. No If "No," continue to Question #11.

4. Does your clinic/practice offer immunization services to all children regardless of insurance coverage?
[Circle response letter]

A. Yes If "Yes," continue to Question #6.
B. No If "No," continue to Question #5.

5. Please circle all of the following groups that you offer immunization services to:
[Circle all that apply]

A. Privately insured children
B. Uninsured children
C. Medicaid children
D. Healthwave/SCHIP children
E. Tricare (military) insured children
F. Illegal/undeclared immigrants

6. Does your clinic/practice currently participate in the Vaccines for Children Program (VFC)?
[Circle response letter]

A. Yes If "Yes," continue to Question #8.
B. No If "No," continue to Question #7.

7. Did your clinic/practice participate in the Vaccines for Children (VFC) program in the past?
[Circle response letter]

A. Yes
B. No

8. Do you have an electronic (i.e., computerized) billing system or service?
[Circle response letter]

A. Yes Name of Vendor/Product:_____
B. No

Please continue to Question #9 on the following page.

9. Do you have an electronic (i.e., computerized) medical record system that includes immunization information? If so, who is the vendor?
[Circle response letter]

A. Yes Name of Vendor/Product:_____
B. No

10. Please indicate your clinic's affiliation, if any, by selecting the option that best describes it from the following:
[Circle one response letter and fill in name of affiliation]

A. Practice Network
Name:_____

B. Hospital Owned
Name:_____

C. Practice Association
Name:_____

Please continue to Question #11 on the following page.

11. Please complete the table below for all Family Physicians, Pediatricians, and General Practice specialists in your clinic (add more names on the back or make an additional copy of this page if needed). If your clinic participates in the VFC program, please indicate which providers are enrolled. If the entirety of your clinic participates in the VFC program, please indicate this by marking the "VFC provider" box by every provider.

	Doctor's Name	Family Medicine	Pediatrics	General Practice	VFC Provider? (*Check for YES*)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

Please mail or fax completed survey to:
Immunize Kansas Kids – KHI
212 SW Eighth Avenue, Suite 300
Topeka, KS 66603-3936
FAX (785) 233-1168

Thank you for completing the Immunize Kansas Kids Clinic Questionnaire!

APPENDIX B

Local Health Department Survey

IMMUNIZE KANSAS KIDS

IMMUNIZE KANSAS KIDS LOCAL HEALTH DEPARTMENT QUESTIONNAIRE

1. Please indicate which local health department you represent:

Health Department Name: _____

County:_____ Telephone:_____

Contact Person:_____ E-mail: _____

2. Does your health department offer immunization services to all children regardless of insurance coverage?

[Circle response letter]

A. Yes — If "Yes," continue to Question #4.
B. No — If "No," continue to Question #3.

3. Please circle all of the following groups that you offer immunization services to:

[Circle all that apply]

A. Privately insured children
B. Uninsured children
C. Healthwave/SCHIP children
D. Tricare (military) insured children
E. Illegal/undeclared immigrants
F. Children eligible for vaccines via the Vaccine for Children (VFC) and other government sponsored programs (i.e. 317, etc.)

4. Do you have a sliding fee scale for immunization services?

[Circle response letter]

A. Yes
B. No

5. Do you bill insurance companies for the immunization services that your health department provides?

[Circle response letter]

A. Yes — If "Yes," continue to Question #6.
B. No — If "No," thank you for your participation in this survey.

6. Which of the following insurance companies do you bill for immunization services?

[Circle all that apply]

A. All private insurance companies
B. Blue Cross and Blue Shield
C. Healthwave/SCHIP children
D. Medicaid (for administration fee only)
E. Other (Specify):

Thank you for your time! You may mail or fax the survey to:

Immunize Kansas Kids - KHI
212 SW 8th Avenue, Suite 300
Topeka, KS 66603
Fax: (785)233-1168

APPENDIX C

Statistical Methods

The information collected was analyzed using univariate (i.e., frequency distributions) and bivariate (i.e., tabulations) techniques. The initial statistical test used to test for significance was the chi-square two-tailed test . Significance level was set at $p=0.05$, meaning that any result with $p<0.05$ was considered statistically significant.

When appropriate, odds ratios (ORs) were computed. An OR is the ratio of the odds in favor of an outcome (for example, providing immunization services) in two groups (for example, small and large clinics). An OR measures whether a characteristic in a group is associated with a certain outcome, and the strength of that association. The further the OR value from 1, the stronger the association between the characteristic and the outcome under study. For example, if the odds ratio of providing immunization services is 16 for clinics located in urban counties compared to rural counties, that means that in urban counties the odds of providing immunizations are 16 times the odds in rural counties.

In some cases two characteristics (or variables) of interest may show an association with the outcome under study, but they may also be correlated with each other. For example, both clinic size and county population density are associated with the likelihood that a clinic offers immunizations, but they are also associated with each other (i.e., large clinics are more common in urban counties). In these cases, to test whether these characteristics have an independent effect on the outcome under study, a stratified analysis was performed. Using this technique, an OR for one variable is calculated for each of the strata of the other variable. (In our example, the OR for clinic size and immunization services is calculated separately for rural and urban clinics.) Then a combined adjusted OR is calculated using a weighted average technique called the Mantel-Haenszel method.[16] The adjusted OR reflects the effect of one characteristic after removing the effect of the other associated variable. (In our example, the adjusted OR reflects the relative likelihood that a clinic providing immunization services is large, independent of its location and the surrounding population density.)

[16] Mantel, N., & Haenszel, W. (1959). Statistical aspects of the analysis of data from retrospective studies of disease. *J. Nat. Cancer Inst. 22*(4): 719–748.

APPENDIX D

County-Level Information

Table D-1. Distribution of Private Clinics by County and Selected Characteristics

County	Clinics providing primary care	Clinics offering immunizations		VFC Clinics		Number of children 0 to 5	Birth Cohort	Patient Load per Clinic	Number of Doctors	Patient Load per Doctor
	N_1	N_2	% (N_2/N_1)	N_3	% (N_3/N_2)	N_4	N_5	(N_5/N_2)	N_6	(N_5/N_6)
Kansas Total	424	277	65.3	141	50.9	188708	37742	136	1153	33
Urban Counties										
Douglas	10	7	70.0	2	28.6	5568	1114	159	33	34
Johnson	52	46	88.5	9	19.6	33641	6728	146	166	41
Sedgwick	61	56	91.8	29	51.8	35697	7139	127	199	36
Shawnee	18	14	77.8	5	35.7	11492	2298	164	79	29
Wyandotte	15	13	86.7	9	69.2	12759	2552	196	58	44
Urban County Total	**156**	**136**	**87.2**	**54**	**39.7**	**19831.4***	**19831**	**146**	**535**	**37**
Semi-Urban Counties										
Allen	4	4	100.0	3	75.0	850	170	43	6	28
Atchison	6	6	100.0	3	50.0	1068	214	36	12	18
Barton	4	3	75.0	2	66.7	1793	359	120	10	36
Bourbon	4	4	100.0	4	100.0	945	189	47	14	14
Butler	15	13	86.7	9	69.2	4131	826	64	23	36
Cherokee	2	0	0.0	0	NA	1561	312	NA	2	156
Cowley	7	6	85.7	1	16.7	2312	462	77	15	31
Crawford	10	5	50.0	3	60.0	2446	489	98	18	27
Dickinson	5	1	20.0	0	0.0	1103	221	221	27	8
Doniphan	2	2	100.0	1	50.0	525	105	53	2	53
Ellis	2	2	100.0	1	50.0	1582	316	158	6	53
Finney	3	1	33.3	1	100.0	4248	850	850	8	106
Ford	4	3	75.0	1	33.3	3035	607	202	15	40
Franklin	1	0	0.0	0	NA	1688	338	NA	6	56
Geary	4	1	25.0	1	100.0	2635	527	527	8	66
Harvey	6	4	66.7	2	50.0	2167	433	108	24	18
Jefferson	5	5	100.0	4	80.0	1178	236	47	2	118
Labette	3	2	66.7	2	100.0	1412	282	141	6	47
Leavenworth	5	5	100.0	5	100.0	4775	955	191	9	106
Lyon	5	5	100.0	2	40.0	2473	495	99	17	29
McPherson	12	3	25.0	2	66.7	1747	349	116	40	9
Miami	3	2	66.7	1	50.0	1944	389	194	13	30
Montgomery	4	3	75.0	3	100.0	2189	438	146	5	88
Neosho	4	4	100.0	3	75.0	1018	204	51	16	13
Osage	1	1	100.0	0	0.0	1082	216	216	1	216
Pottawatomie	6	5	83.3	2	40.0	1351	270	54	9	30

Table D-1 (continued). **Distribution of Private Clinics by County and Selected Characteristics**

County	Clinics providing primary care N_1	Clinics offering immunizations N_2	Clinics offering immunizations % (N_2/N_1)	VFC Clinics N_3	VFC Clinics % (N_3/N_2)	Number of children 0 to 5 N_4	Birth Cohort N_5	Patient Load per Clinic (N_5/N_2)	Number of Doctors N_6	Patient Load per Doctor (N_5/N_6)
Reno	3	1	33.3	0	0.0	4138	828	828	2	414
Riley	3	3	100.0	0	0.0	3586	717	239	13	55
Saline	6	3	50.0	2	66.7	3713	743	248	34	22
Seward	7	5	71.4	1	20.0	2156	431	86	6	72
Sumner	4	3	75.0	1	33.3	1725	345	115	9	38
Semi-Urban County Total	**151**	**106**	**70.2**	**61**	**57.5**	**2147.6***	**13315**	**126**	**378**	**35**
Rural Counties										
Anderson	2	1	50.0	1	100.0	503	101	101	5	20
Barber	2	1	50.0	0	0.0	268	54	54	8	7
Brown	5	5	100.0	5	100.0	684	137	27	8	17
Chase	0	0	NA	0	NA	182	36	NA	0	NA
Chautauqua	1	0	0.0	0	NA	195	39	NA	1	39
Cheyenne	1	0	0.0	0	NA	149	30	NA	4	7
Clark	1	0	0.0	0	NA	146	29	NA	2	15
Clay	3	0	0.0	0	NA	475	95	NA	8	12
Cloud	1	0	0.0	0	NA	506	101	NA	4	25
Coffey	5	1	20.0	0	0.0	525	105	105	9	12
Comanche	0	0	NA	0	NA	111	22	NA	0	NA
Decatur	1	0	0.0	0	NA	157	31	NA	4	8
Edwards	1	0	0.0	0	NA	202	40	NA	3	13
Elk	0	0	NA	0	NA	138	28	NA	0	NA
Ellsworth	3	0	0.0	0	NA	274	55	NA	1	55
Gove	1	0	0.0	0	NA	182	36	NA	5	7
Graham	2	0	0.0	0	NA	133	27	NA	2	13
Grant	3	2	66.7	2	100.0	688	138	69	4	34
Gray	0	0	NA	0	NA	459	92	NA	0	NA
Greeley	0	0	NA	0	NA	103	21	NA	0	NA
Greenwood	2	1	50.0	1	100.0	420	84	84	2	42
Hamilton	1	0	0.0	0	NA	184	37	NA	1	37
Harper	4	0	0.0	0	NA	369	74	NA	9	8
Haskell	2	0	0.0	0	NA	392	78	NA	1	78
Hodgeman	0	0	NA	0	NA	101	20	NA	0	NA
Jackson	2	2	100.0	2	100.0	874	175	87	5	35
Jewell	2	0	0.0	0	NA	173	35	NA	6	6
Kearny	0	0	NA	0	NA	400	80	NA	0	NA
Kingman	1	1	100.0	0	0.0	528	106	106	1	106
Kiowa	0	0	NA	0	NA	181	36	NA	0	NA
Lane	2	1	50.0	1	100.0	114	23	23	1	23

Table D-1 (continued). **Distribution of Private Clinics by County and Selected Characteristics**

County	Clinics providing primary care	Clinics offering immunizations		VFC Clinics		Number of children 0 to 5	Birth Cohort	Patient Load per Clinic	Number of Doctors	Patient Load per Doctor
	N_1	N_2	% (N_2/N_1)	N_3	% (N_3/N_2)	N_4	N_5	(N_5/N_2)	N_6	(N_5/N_6)
Lincoln	1	0	0.0	0	NA	185	37	NA	2	19
Linn	0	0	NA	0	NA	603	121	NA	0	NA
Logan	1	0	0.0	0	NA	195	39	NA	1	39
Marion	3	1	33.3	1	100.0	730	146	146	5	29
Marshall	5	0	0.0	0	NA	543	109	NA	7	16
Meade	2	0	0.0	0	NA	368	74	NA	4	18
Mitchell	2	0	0.0	0	NA	352	70	NA	4	18
Morris	1	1	100.0	1	100.0	347	69	69	3	23
Morton	0	0	NA	0	NA	283	57	NA	0	NA
Nemaha	4	1	25.0	1	100.0	765	153	153	11	14
Ness	4	2	50.0	2	100.0	177	35	18	3	12
Norton	1	0	0.0	0	NA	285	57	NA	3	19
Osborne	3	0	0.0	0	NA	205	41	NA	3	14
Ottawa	1	0	0.0	0	NA	349	70	NA	1	70
Pawnee	1	0	0.0	0	NA	407	81	NA	5	16
Phillips	1	0	0.0	0	NA	332	66	NA	1	66
Pratt	1	1	100.0	0	0.0	570	114	114	3	38
Rawlins	1	0	0.0	0	NA	134	27	NA	3	9
Republic	4	0	0.0	0	NA	264	53	NA	6	9
Rice	2	2	100.0	0	0.0	627	125	63	29	4
Rooks	3	2	66.7	2	100.0	321	64	32	4	16
Rush	1	0	0.0	0	NA	172	34	NA	2	17
Russell	1	0	0.0	0	NA	372	74	NA	1	74
Scott	0	0	NA	0	NA	310	62	NA	0	NA
Sheridan	3	1	33.3	1	100.0	140	28	28	5	6
Sherman	2	1	50.0	1	100.0	411	82	82	4	21
Smith	1	0	0.0	0	NA	194	39	NA	2	19
Stafford	3	0	0.0	0	NA	274	55	NA	2	27
Stanton	3	3	100.0	0	0.0	189	38	13	1	38
Stevens	1	0	0.0	0	NA	447	89	NA	12	7
Thomas	2	1	50.0	1	100.0	548	110	110	5	22
Trego	1	0	0.0	0	NA	168	34	NA	2	17
Wabaunsee	1	0	0.0	0	NA	428	86	NA	1	86
Wallace	1	0	0.0	0	NA	98	20	NA	3	7
Washington	3	0	0.0	0	NA	367	73	NA	3	24
Wichita	0	0	NA	0	NA	210	42	NA	0	NA
Wilson	4	3	75.0	3	100.0	601	120	40	4	30
Woodson	2	2	100.0	2	100.0	188	38	19	1	38
Rural County Total	**117**	**35**	**29.9**	**26**	**74.3**	**333.0***	**4595**	**131**	**240**	**19**

Note: * = The asterisk denotes that these values are simple averages, and not column totals.

APPENDIX E

Additional Analysis Results

RELATIONSHIP BETWEEN COUNTY POPULATION DENSITY, CHILDREN AGES 0 TO 5 POPULATION SIZE AND LEVEL OF IMMUNIZATION SERVICES

An attempt was made to understand the independent effect of county population density and number of children resident in the county on the level of immunization services provided by private clinics. The results show that both a higher county pediatric population size and higher population density appear to be associated with private clinics that provide immunization services, and these two characteristics interact with each other in complex ways. This analysis is complicated by the fact that for the private clinics located in semi-urban counties, all but two of those counties have 600 or more children ages 0 to 5; similarly, for the private clinics located in urban counties, all of those counties have 600 or more children ages 0 to 5. Therefore the effect of the number of children resident in the county cannot be assessed in urban and semi-urban counties. In contrast, 22 of the 117 private clinics (18.8 percent) located in rural counties are in counties with a population of 600 or more children; therefore in rural counties the effect of population size on level of immunization services can be assessed. Based on the distribution of the level of immunization services in rural counties by number of children (Table E-1), the odds ratio for private clinics of providing immunizations in rural counties with 600 children or more is 8.0 compared to clinics in rural counties with fewer than 600 children, and this difference is statistically significant. Although this odds ratio is lower than the 12.1 value observed for all counties (regardless of their population density), it shows that, even among rural counties, private clinics in counties with 600 or more children ages 0 to 5 are much more likely to offer immunization services.

Table E-1. **Level of Immunization Services in Private Clinics Located in Rural Counties by Number of Children Ages 0 – 5, Kansas, 2006**

	NUMBER OF CHILDREN IN COUNTY					
	< 600 children		>= 600 children		*Total*	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services	20	21.0	15	68.2	35	29.9
Do not offer immunization services	75	79.0	7	31.8	82	70.1
Total	95	100.0	22	100.0	117	100.0

Another way of studying the independent effects of population density and number of resident children ages 0 to 5 on the level of immunization services is by observing the effect of population density in counties with 600 or more children (Table E-2). This process is similar to the one just explained in the paragraph above, except that in this case pediatric population size, rather than population density, is held constant. Private clinics providing immunization services that are located in counties with 600 or more children are equally likely to be located in semi-urban and rural counties (OR = 1.1), but they are more likely to be located in urban than in rural counties (OR=3.2).[17]

Table E-2. **Level of Immunization Services in Private Clinics Located in Counties with 600 or More Children by Population Density, Kansas, 2006**

	COUNTY POPULATION DENSITY					
	Rural		Semi-Urban		Urban	
Level of Immunization Services	**N**	**%**	**N**	**%**	**N**	**%**
Offer immunization services	15	68.2	104	69.8	136	87.2
Do not offer immunization services	7	31.8	45	30.2	20	12.8
Total	22	100.0	149	100.0	156	100.0

USE OF ELECTRONIC BILLING AND MEDICAL RECORD SYSTEMS

Private clinics that provide immunizations were asked about their use of electronic information management systems. The purpose of these questions was to explore the potential for electronic data interfaces between private clinics and the state immunization registry. Of the 277 private clinics that provide immunization services, over 84.5 percent reported that they have an electronic billing system, but less than one third (31.4 percent) have an electronic medical record system (Table E-3).

[17] The odds ratio for semi-urban counties was not statistically significant, while the odds ratio for urban county was statistically significant.

Table E-3. **Use of Electronic Information Management Systems Among Private Clinics That Provide Immunizations, Kansas, 2006**

	Number of Clinics	Percentage of Clinics
	N	%
Have an Electronic Billing System?		
Yes	234	84.5
No	30	10.8
Don't know/not reported	13	4.7
Total	277	100.0
Have an Electronic Medical Record System?		
Yes	87	31.4
No	174	62.8
Don't know/not reported	16	5.8
Total	277	100.0