Kindergarten Vaccination Coverage Survey

School Year 2017-2018

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Background

Vaccinations: The Kansas Kindergarten Immunization Coverage Assessment is an annual survey conducted by the Kansas Department of Health and Environment (KDHE) to assess vaccination coverage among kindergarten students. The population for this study included kindergarten students between the ages of five and seven years on the first day of the 2017-2018 academic year and enrolled in either a public or private school in Kansas.

The Advisory Committee for Immunization Practices (ACIP) recommends children by five years of age receive the following vaccinations (Table 1):

Table 1: ACIP Birth to Six Years Immunization Recommendations

	Diseases Prevented	Requirement for School	Number of Doses	Healthy People 2020 Coverage Goals
DTaP5	Diphtheria, Tetanus, Pertussis	Yes	5	95%
DTaP4			4	
HepB3	Hepatitis B	Yes	3	95%
MMR2	Measles, Mumps, Rubella	Yes	2	95%
Polio4	Polio	Yes	4	95%
Polio3			3	
Var2	Varicella	Yes (or history of disease)	2	95%
5-4-2-2-3	DTaP5, Polio4, MMR2, Var2, Hep3			
HepA2	Hepatitis A	Recommended	2	85%
Hib3	*Haemophilus influenzae* type b	Recommended	3	90%
PCV4	*Streptococcus pneumoniae*	Recommended	4	

Exemptions & Exclusions: In Kansas, two legal alternatives to required vaccinations are permissible, medical and religious exemptions.[1] To receive a medical exemption, a physician must annually sign a form stating the reason for exemption and from which vaccine(s) the child is exempt. To receive a religious exemption, a parent or guardian must write a statement explaining that the child is an adherent of a religious denomination whose religious teachings are opposed to such tests or inoculations which is not required to be renewed annually. Additionally, a separate statute (K.S.A. 72-5211a) allows schools to exclude students from school who do not

[1] Statute 72-5209: Same; certification of completion required, alternatives; duties of school boards. (a) In each school year, every pupil enrolling or enrolled in any school for the first time in this state, and each child enrolling or enrolled for the first time in a preschool or day care program operated by a school, and such other pupils as may be designated by the secretary, prior to admission to and attendance at school, shall present to the appropriate school board certification from a physician or local health department that the pupil has received such tests and inoculations as are deemed necessary by the secretary by such means as are approved by the secretary. Pupils who have not completed the required inoculations may enroll or remain enrolled while completing the required inoculations if a physician or local health department certifies that the pupil has received the most recent appropriate inoculations in all required series. Failure to timely complete all required series shall be deemed non-compliance. (b) As an alternative to the certification required under subsection (a), a pupil shall present: (1) An annual written statement signed by a licensed physician stating the physical condition of the child to be such that the tests or inoculations would seriously endanger the life or health of the child, or (2) a written statement signed by one parent or guardian that the child is an adherent of a religious denomination whose religious teachings are opposed to such tests or inoculations. (c) On or before May 15 of each school year, the school board of every school affected by this act shall notify the parents or guardians of all known pupils who are enrolled or who will be enrolling in the school of the provisions this act and any policy regarding the implementation of the provisions of this act adopted by the school board. (d) If a pupil transfers from one school to another, the school from which the pupil transfers shall forward with the pupil's transcript the certification or statement showing evidence of compliance with the requirements of this act to the school to which the pupil transfers.

have the required vaccinations or an acceptable exemption. However, each school board has the authority whether to or not to enforce this statute.

Methods

Sampling and Data Collection

Each public and private school in Kansas with a kindergarten class received a letter requesting participation in this study.

Vaccination Coverage: Schools were assigned to one of three groups:

1. Send in 30 vaccination records selected at random
2. Send in all vaccination records (for schools with less than 30 kindergarten students)
3. Send in no vaccination records

Paper vaccination records were sent to KDHE with all personal information removed from each record, except date of birth. Records were excluded if date of birth was missing or illegible, or child was <5 years or >7 years of age.

Exemption & Exclusion: All schools were requested to complete a form or online survey collecting information regarding:

- Total number of kindergarten students enrolled for the 2017-2018 academic year
- Total number of kindergarten students with exemptions to vaccination by type (religious or medical)
  - Students with exemption to all vaccines
  - Students with exemption, who have one or more vaccinations
- School's policy to exclude students not up-to-date (UTD)
  - Reasons for schools that do not exclude

Data Analysis

Vaccination Coverage: Sample population for vaccination coverage analysis included children with date of birth on vaccination data source that met age requirements for inclusion. Data was weighted based on county size and school type (public or private) for:

- Vaccinations required for school (DTaP5*, Polio4♦, MMR2, HepB3 and Var2†)
- Vaccinations recommended for school (Hib3, PCV4 and HepA2)
- Healthy People 2020 (HP2020) goals (DTaP4, Polio3, MMR2, Var2, and HepB3)

*5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday
♦4 doses of Polio or 3 doses if third is administered on or after the fourth birthday
† Records with history of disease were not included in analysis due to missing date of disease

Exemption & Exclusion: Exemption and exclusion census data analysis included the total number of kindergarten students enrolled in responding schools. Exemptions were classified as either religious or medical.

Analyses for vaccination coverage and exemption included:

- Statewide results- trended by academic year
- By school type
- By county level

Results & Implications

Data Collection

Vaccination Coverage: Of the 374 Kansas schools that received requests to provide vaccination records, 347 (92.8%) responded with usable data. A total of 7,929 vaccination records from all 105 counties were included in analysis, which equated to one record representing 1.7 kindergarten students in Kansas (Table 2).

Exemption & Exclusion: Of the 814 Kansas schools that received requests for information regarding exemption and exclusion data**,** 750 (92.1%), in 104 counties responded and were included in the analysis (Table 2).

Table 2: Data Collection Results for Kansas Kindergarten Assessment, 2017-2018

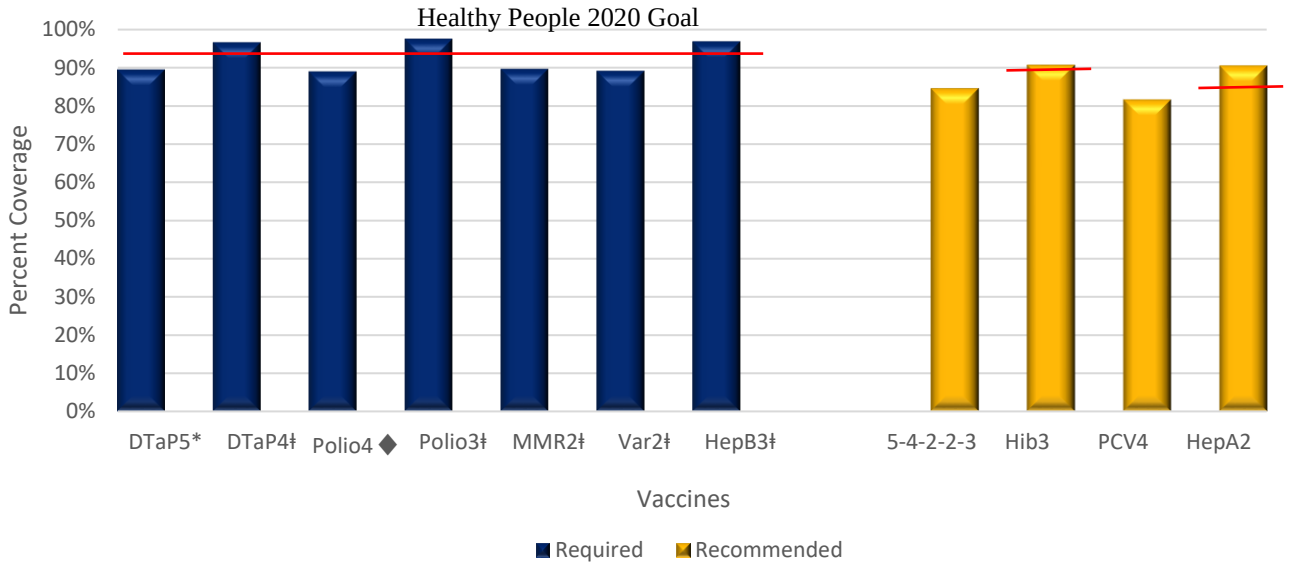
	Vaccination Coverage	Exemption & Exclusion
Number of schools that records were requested	374	814
Number of schools that records were received	347 (92.8%)	750 (92.1%)
Counties included (out of 105)	105 (100.0%)	104 (99.0%)

Kindergarten Vaccination Coverage

Statewide Vaccination Coverage

- Coverage for all required vaccines individually for school entry was above 88% (Figure 1).
    - HepB3 had the highest coverage (96.8%).
    - Complete series for all five required vaccinations (5-4-2-2-3) had a coverage level of 84.4%.
- HP2020 goals were met for DTaP4, Polio3, HepB3, Hib3 and HepA2 (Figure 1).

Figure 1: Statewide vaccination coverage levels of kindergarten students at school entry by vaccine – Kansas, 2017-2018



**5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday*
◆4 doses of Polio or 3 doses if third is administered on or after the fourth birthday
‡ Vaccines for which there are Healthy People 2020 goals

Implications:

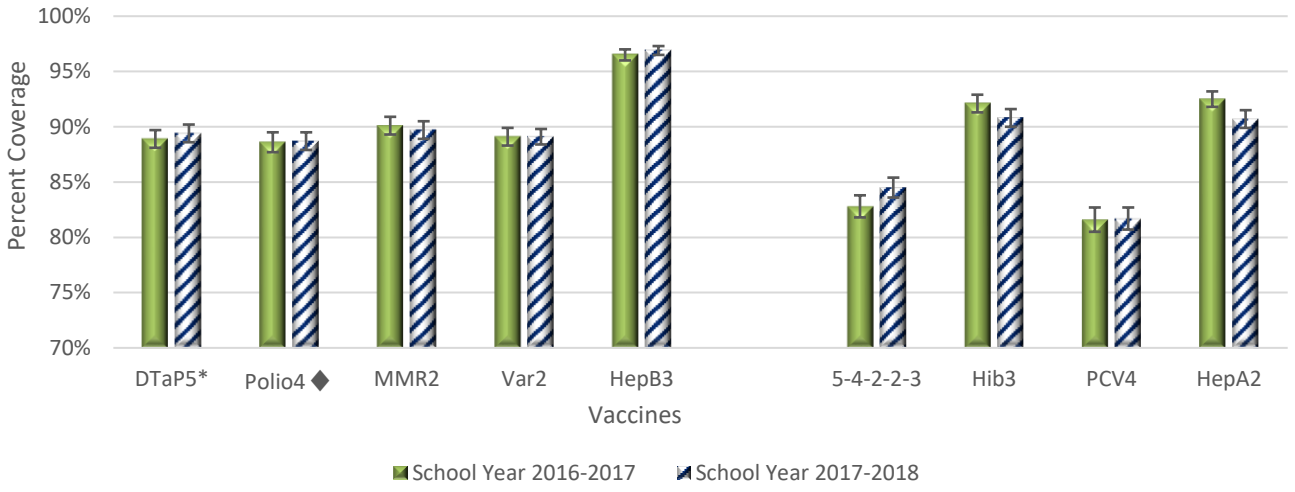
- The two live vaccines, MMR2 (90.1%) and Var2 (89.1%) remain below HP2020 goals.
  - MMR2 coverage above 95% is needed for effective herd immunity.[2]
  - Low coverage rates lead to an increased risk of outbreaks for measles, mumps, rubella, and varicella.

Statewide Vaccination Coverage Trended by Academic Year

- Decreases in coverage for Hib3 and HepA2 in 2017-2018 academic year compared to the previous year (-1.4% and -1.9%, respectively) (Figure 2).
- Increases in 5-4-2-2-3 series were observed in 2017-2018 compared to the previous school year (4.2% and 6.6%, respectively) (Figure 2).
- No changes in coverage levels were statistically significant

[2] Office of Disease Prevention and Health Promotion. (2019, January 16). Healthy People 2020: IID-10.2 Data Details. Retrieved January 16, 2019, from https://www.healthypeople.gov/node/4649/data_details

Figure 2: Statewide vaccination coverage levels of kindergarten students at school entry by vaccine – Kansas, 2016-2017 to 2017-2018



**5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday*
◆4 doses of Polio or 3 doses if third is administered on or after the fourth birthday

Implications:

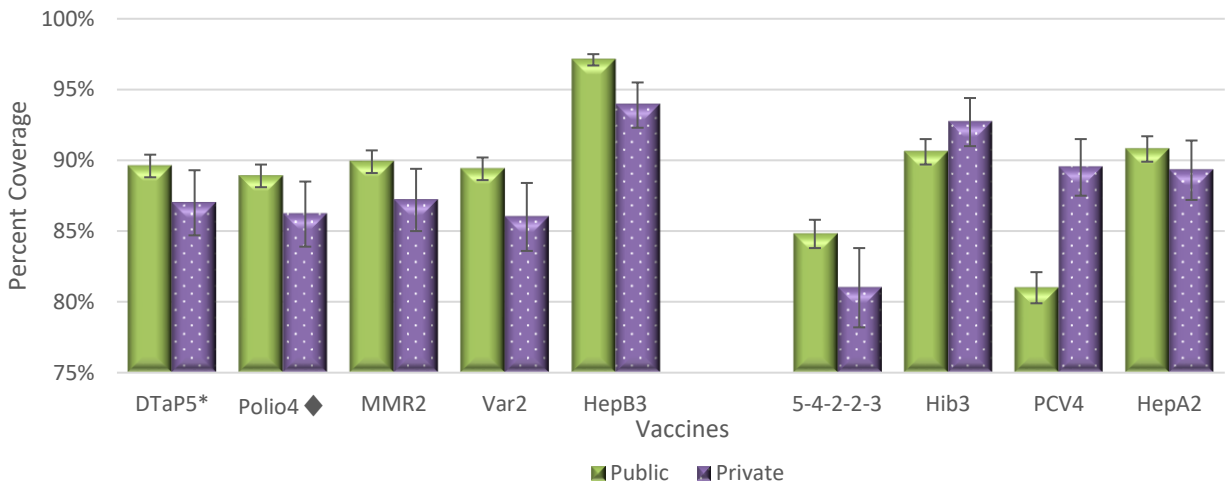
- Coverage level trends have wavered year to year but have remained largely unchanged since 2014-2015 academic year.
  - No vaccination campaigns to increase these rates have been implemented during this period.
- While an increase in MMR2 rates were observed, it remains below the 95% needed for effective herd immunity.[3]
  - In the summer of 2017 an outbreak of measles occurred in Sedgwick and Butler counties due to an unvaccinated person exposed to the virus during international travel.

Vaccination Coverage by School Type (Public vs. Private)

- Public schools had significantly higher coverage for Var2 and HepB3 (Figure 3).
- Private schools had significantly higher coverage for PCV4 (Figure 3).

[3] Office of Disease Prevention and Health Promotion. (2019, January 16). Healthy People 2020: IID-10.2 Data Details. Retrieved January 16, 2019, from https://www.healthypeople.gov/node/4649/data_details

Figure 3: Vaccination coverage levels of kindergarten students by vaccine and school type – Kansas, 2017-2018



**5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday*
◆4 doses of Polio or 3 doses if third is administered on or after the fourth birthday

Implications:

- The higher coverage of required vaccines among public schools could be attributed to the fact there are more public schools that exclude non-UTD students when compared to private schools.
  - Schools that don't exclude may be less likely to verify vaccine compliance and therefore have more students attending school that are not UTD.
- The higher coverage of recommended vaccines among private schools may be due to better documentation.

Vaccination Coverage by County

County-level coverage rates by vaccine are listed in Appendix 1.

Maps of unvaccinated kindergarteners by vaccine are in Appendix 2.

- Comanche, Elk, Graham, Greeley, Lane, and Rawlins counties had 100% coverage for all vaccines required for school entry.
- Pawnee, Hodgeman, and Lane counties had 100% coverage for all recommended vaccines.
- Twenty-one counties (20%) had >5% of kindergarten students not UTD for all vaccines required for school entry.
  - Atchison County had the lowest vaccine coverage for a majority of required vaccines with approximately 35% of kindergarteners not UTD for DTaP5, Polio4, MMR2, and Var2.
- Seventy-nine (75%) Kansas counties had >5% of kindergarteners not UTD for MMR2.
  - Atchison County had the lowest MMR2 coverage rate with 38% of kindergarteners not UTD.

Implications:

- Counties with >5% of kindergarteners not UTD for MMR2 do not have herd immunity which protects those unable to be vaccinated due to age or medical reasons.
  - Measles is especially dangerous for babies and young children; which can cause deafness, brain damage, and death.[4]
  - Rubella infection in pregnant women can cause congenital rubella which can result in miscarriage, or birth defects including deafness, heart defects, and low birth weight.[5]

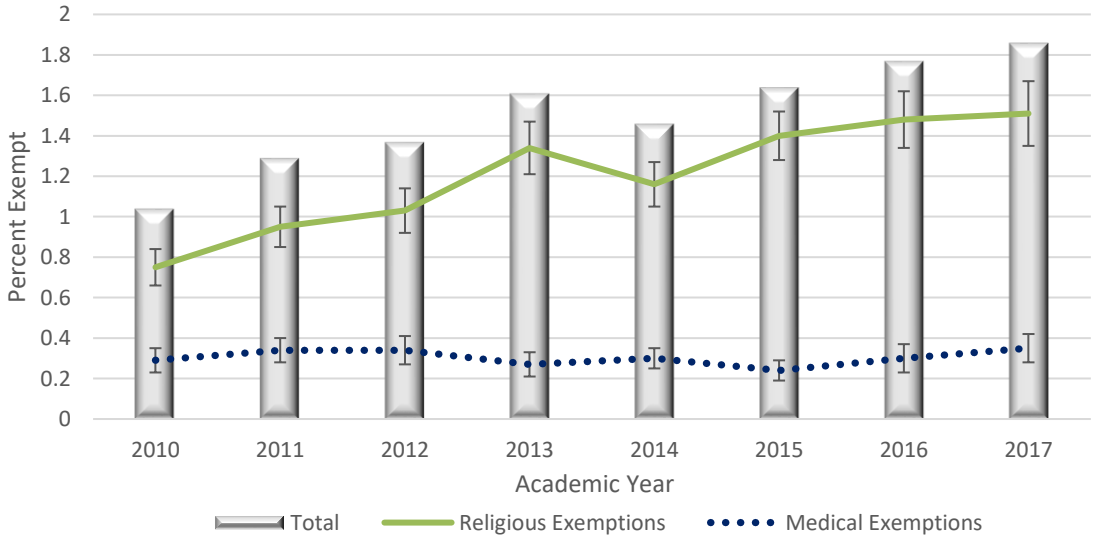
- There are more counties in the eastern half of the state with >5% of kindergarteners not UTD for MMR2.
  - Intervention programs to increase vaccination coverage should be focused in these counties.

Kindergarten Vaccine Exemptions

Exemptions Statewide & Trended by Academic Year

- 663 (1.9%) out of 35,706 kindergartners reported having a vaccine exemption (Figure 5).
  - 539 (81.3%) were religious exemptions.
  - 124 (18.7%) were medical exemptions.
- Total exemptions among kindergarteners increased from 1.04% in 2010 to 1.9% in 2017 (Figure 5).
  - Religious exemptions increased from 0.75% in 2010 to 1.5% in 2017
  - Medical exemption levels have not changed significantly since 2010.

Figure 5: Exemption rates among kindergarten students, by exemption type and year – Kansas, 2010-2017



[4] National Center for Immunization and Respiratory Diseases. (2015, August 14). Measles Fact Sheet for Parents | CDC. Retrieved February 21, 2019, from https://www.cdc.gov/vaccines/parents/diseases/child/measles.html
[5] National Center for Immunization and Respiratory Diseases, & Division of Viral Diseases. (2017, September 15). Rubella | Pregnancy | CDC. Retrieved February 21, 2019, from https://www.cdc.gov/rubella/pregnancy.html

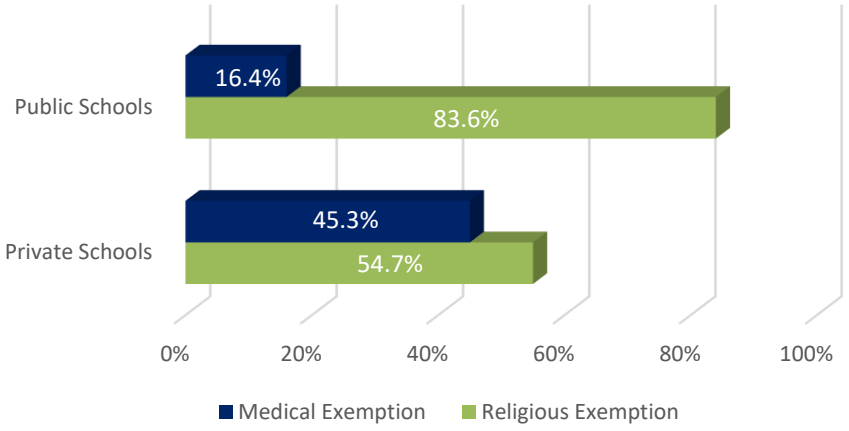
Implications:

- The annual increase in vaccine exemptions increases risk for outbreaks of vaccine-preventable diseases.
    - Incidence of vaccine-preventable diseases has increased in the United States, including measles which was declared eliminated in 2000. In summer 2017, Kansas experienced an outbreak of measles after an unvaccinated person was exposed while traveling internationally.
    - During 2016-2017, numerous states, including Kansas, experienced outbreaks of mumps. In Kansas, a majority of ill persons were under-vaccinated or unvaccinated in two outbreaks of mumps.
- Religious exemptions account for over 80% of vaccine exemptions in Kansas with the rate steadily increasing since 2010. Since religious exemptions do not require annual renewal, they could provide a more convenient alternative for parents as compared to getting their child up-to-date on vaccinations.

Exemptions by School Type (Public vs. Private)

- Private schools reported a higher vaccine exemption rate (2.6%) compared to public schools (1.4%)
    - Private schools have a higher medical exemption rate (45.3%) when compared to public schools (16.4%) whereas public schools have a higher rate of religious exemptions (83.6%) when compared to private schools (54.7%) [Figure 6].

Figure 6: Percentage of exemption type by school type – Kansas, 2017-2018



Implications:

- Private schools are often religious and may require more from a parent for a religious exemption than a statement of vaccinations being against their beliefs.
- Public school administrators and school boards may be less willing to challenge religious exemptions; allowing for more of these types of exemptions among their students.
    - Because religious exemptions do not require annual renewal like medical exemptions, the topic may only be addressed one time in a student's school life.

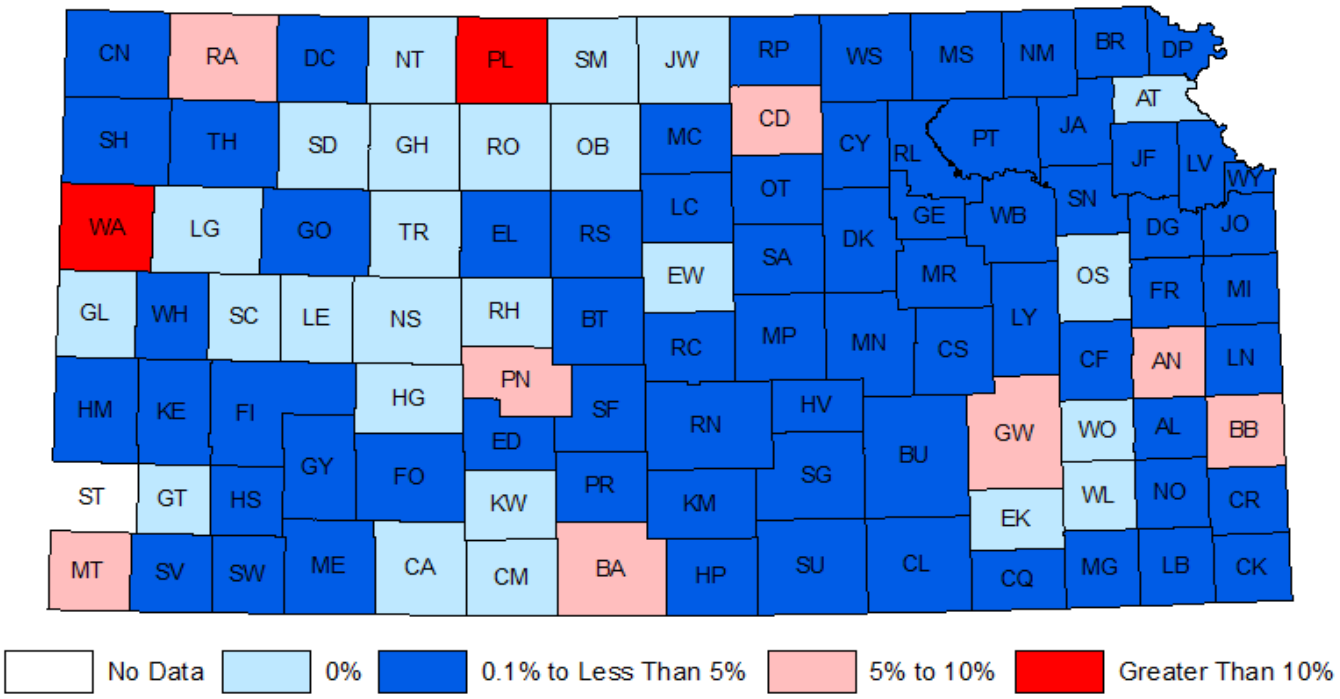
Exemptions by County

County-level exemption rates by exemption type and county are listed in Appendix 3.

Maps of vaccine exemptions by exemption type are in Appendix 4.

- Twenty-five (23.8%) counties reported zero vaccine exemptions (Figure 7).
  - Thirty-three (31.4%) counties reported zero religious exemptions.
  - Sixty-six (62.9%) counties reported zero medical exemptions.
- Anderson, Barber, Bourbon, Cloud, Greenwood, Morton, Pawnee, Phillips, Rawlins, and Wallace counties reported religious vaccine exemption rates above 5%.

Figure 7: Exemption rates among kindergartners – Kansas, 2017-2018



Implications:

- Seventy-nine (76%) Kansas counties have kindergarten children with a vaccine exemption.
  - Vaccine-exempt children are at risk for contracting vaccine-preventable diseases and subsequently infecting other unimmunized or under-immunized individuals (e.g., infants and immunocompromised persons) or other high-risk persons.
  - It is important that the numbers of exempt and under-immunized school-aged children remain low to maintain herd immunity.
- Counties with >5% of kindergarteners with a vaccine exemption no longer have the benefit of herd immunity for highly infectious diseases like measles which needs 95% of population to be vaccinated.
  - Intervention efforts to determine reasons for high exemption rates and strategies to lower them should be focused in these counties.

School Exclusion Policy

- Schools were surveyed about their policies for excluding non-UTD students. All 750 schools who provided vaccination records and included in analysis also responded to the exclusion policy question:
    - An exclusion policy was present in 77.2% of responding schools
        - More public schools had an exclusion policy compared to private (79.6% vs. 57.8%)
        - 19.5% of schools did not have an exclusion policy
        - 3.3% of schools did not know their exclusion policy
- Schools without an exclusion policy were asked to provide a reason (Table 3):

Table 3: Main reasons schools lacked an exclusion policy – Kansas, 2017-2018

Reason	Percentage
Felt students would miss too much school and would lose funding	29.8%
School offers a grace period or work with parents to get students up-to-date on vaccinations	19.1%
School administration did not support having / enforcing an exclusion policy	17.6%

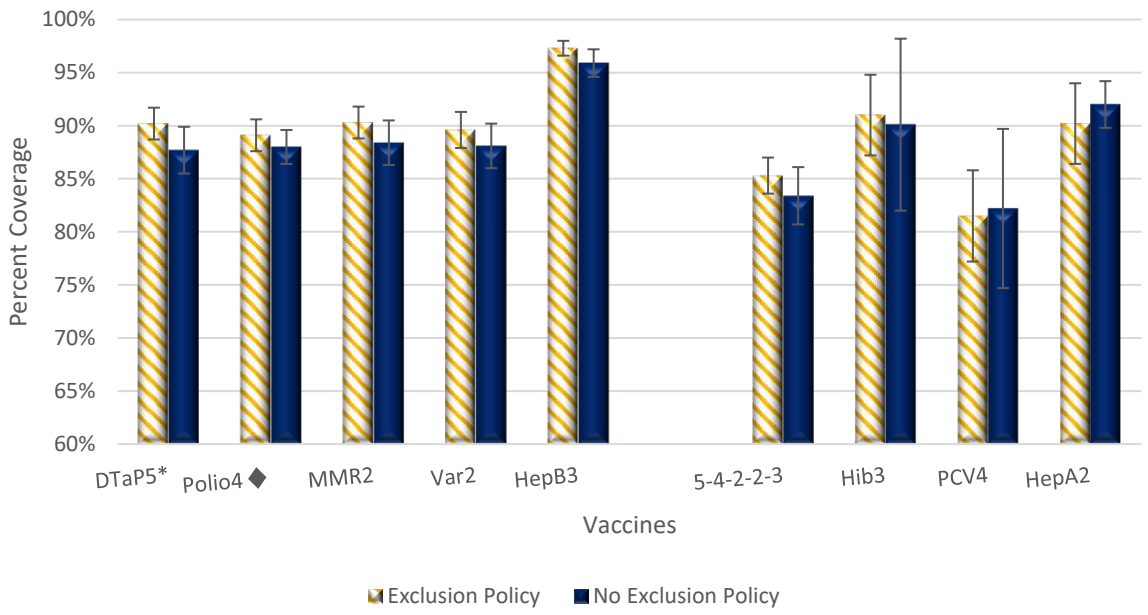
Implications:

- Concerns of students missing too much class and the school losing funding was listed as the main reason for not having an exclusion policy; however, an unvaccinated student who is exposed to certain vaccine-preventable diseases is required to be excluded from school for a minimum of 21 days.
    - Dedicating time and resources to requiring up-to-date vaccination status for students could protect students from contracting vaccine-preventable diseases and lessen the number of students who would require exclusion if exposed, which in turn would minimize missed class time.

Vaccination Coverage Stratified by School Exclusion Policy

- Forty-five percent of schools which provided exclusion policy information also provided vaccination records for the coverage assessment.
    - When stratified by exclusion policy, it was observed that schools with an exclusion policy had approximately 3% higher coverage levels for vaccines required for school entry compared to schools that did not exclude (Figure 8). Although this finding was not statistically significant.

Figure 8: Vaccination coverage of kindergarten students by vaccine and school exclusion policy – Kansas, 2017-2018



**5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday*
♦4 doses of Polio or 3 doses if third is administered on or after the fourth birthday

Implications:

- Exclusion policies have proven to be effective at ensuring students are UTD for vaccinations on the first day of school.
    - By excluding non-UTD students, the burden of disease and occurrence of outbreaks may be reduced.

Limitations

- ☐ Recommended vaccinations may not be consistently reported on the vaccination record, creating a possible underreporting of coverage for Hib3, HepA2, and PCV4.
- ☐ Aggregate data was reported by school personnel for the number of exempt students so unable to verify exemption data.
- ☐ No descriptive data about sex, race, or ethnicity was collected and therefore effects of these factors on vaccination coverage could not be analyzed.
- ☐ Date of varicella disease was rarely given so UTD status for varicella vaccine was unable to be determined, so records where history of varicella was noted were not included in varicella coverage analysis.
    - Thirty-seven (0.47%) records were removed from varicella analysis.

Strengths

- ☐ Vaccine coverage results provide good representation of kindergarteners in Kansas due to:
    - Large sample size

- Standardized random sampling techniques
- High response rate

☐ Results enable state and local officials to identify counties and regions with low vaccine coverage levels.

- Intervention programs should be focused to areas of greatest need for enhanced vaccination delivery methods and educational campaigns.

Appendix 1: Average school vaccination coverage levels for children at school entry by county – Kansas, 2017-2018 §

COUNTY	DTaP5*	Polio4♦	MMR2	Var2	HepB3	5-4-2-2-3	Hib3§	PCV4§	HepA2§
STATEWIDE	**89%**	**89%**	**90%**	**89%**	**97%**	**84%**	**91%**	**81%**	**90%**
ALLEN	99%	99%	93%	95%	97%	90%	96%	74%	91%
ANDERSON	86%	84%	86%	87%	92%	84%	91%	79%	79%
ATCHISON	66%	66%	62%	62%	99%	59%	92%	77%	89%
BARBER	85%	89%	78%	80%	89%	69%	91%	66%	91%
BARTON	92%	91%	93%	93%	98%	89%	95%	93%	96%
BOURBON	89%	92%	86%	85%	100%	83%	96%	85%	91%
BROWN	92%	95%	95%	93%	99%	90%	99%	92%	96%
BUTLER	89%	87%	88%	88%	93%	82%	95%	88%	89%
CHASE	83%	83%	76%	76%	79%	62%	86%	76%	76%
CHAUTAUQUA	68%	71%	71%	71%	97%	68%	97%	86%	87%
CHEROKEE	88%	87%	86%	86%	93%	79%	93%	77%	88%
CHEYENNE	96%	96%	96%	88%	100%	88%	100%	83%	92%
CLARK	94%	94%	94%	94%	100%	94%	100%	85%	94%
CLAY	75%	75%	78%	78%	94%	75%	91%	91%	85%
CLOUD	88%	83%	88%	88%	92%	80%	84%	80%	87%
COFFEY	80%	82%	82%	82%	98%	75%	95%	91%	95%
COMANCHE	100%	100%	100%	100%	100%	100%	100%	96%	100%
COWLEY	83%	83%	86%	86%	98%	80%	88%	77%	93%
CRAWFORD	91%	91%	93%	90%	94%	86%	83%	75%	85%
DECATUR	93%	86%	93%	93%	100%	86%	96%	96%	96%
DICKINSON	93%	93%	95%	95%	99%	92%	91%	92%	99%
DONIPHAN	95%	94%	95%	95%	98%	91%	94%	87%	95%
DOUGLAS	91%	87%	91%	89%	98%	82%	92%	86%	89%
EDWARDS	94%	94%	94%	91%	97%	88%	100%	82%	100%
ELK	100%	100%	100%	100%	100%	100%	100%	88%	100%
ELLIS	96%	94%	96%	96%	99%	92%	96%	94%	97%
ELLSWORTH	93%	93%	97%	95%	100%	92%	96%	90%	97%
FINNEY	92%	93%	92%	93%	100%	91%	96%	87%	97%
FORD	86%	84%	85%	85%	99%	80%	94%	90%	92%
FRANKLIN	87%	87%	87%	87%	98%	84%	94%	81%	93%
GEARY	93%	91%	93%	92%	97%	89%	95%	86%	93%
GOVE	97%	93%	97%	93%	97%	93%	90%	90%	93%
GRAHAM	100%	100%	100%	100%	100%	100%	100%	93%	100%
GRANT	93%	93%	93%	93%	100%	93%	97%	87%	93%
GRAY	83%	81%	86%	83%	93%	79%	92%	80%	87%
GREELEY	100%	100%	100%	100%	100%	100%	100%	87%	93%
GREENWOOD	86%	89%	86%	89%	89%	78%	91%	81%	85%
HAMILTON	90%	90%	87%	80%	100%	80%	100%	93%	93%
HARPER	69%	70%	69%	70%	98%	63%	95%	78%	85%
HARVEY	85%	81%	90%	91%	86%	74%	88%	78%	92%
HASKELL	91%	94%	98%	96%	96%	87%	96%	83%	94%
HODGEMAN	100%	100%	100%	94%	100%	94%	100%	100%	100%
JACKSON	83%	83%	86%	83%	93%	81%	94%	89%	89%

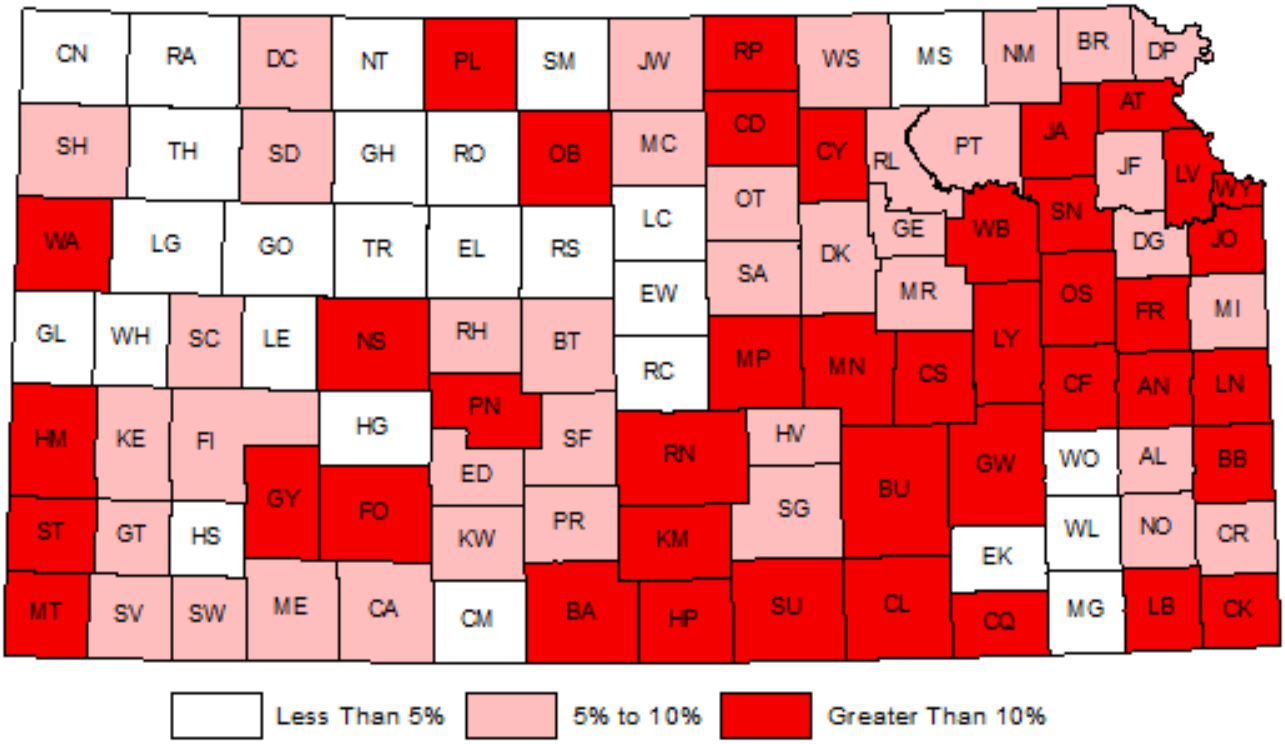
COUNTY	DTaP5*	Polio4♦	MMR2	Var2	HepB3	5-4-2-2-3	Hib3§	PCV4§	HepA2§
STATEWIDE	**89%**	**89%**	**90%**	**89%**	**97%**	**84%**	**91%**	**81%**	**90%**
JEFFERSON	89%	88%	90%	90%	97%	82%	94%	92%	94%
JEWELL	95%	90%	95%	95%	100%	90%	100%	71%	90%
JOHNSON	90%	89%	88%	87%	96%	83%	96%	92%	94%
KEARNY	96%	95%	95%	94%	100%	91%	97%	90%	97%
KINGMAN	76%	76%	76%	71%	94%	69%	94%	80%	90%
KIOWA	92%	92%	92%	89%	97%	86%	92%	82%	89%
LABETTE	94%	89%	89%	89%	97%	83%	94%	80%	90%
LANE	100%	100%	100%	100%	100%	100%	100%	100%	100%
LEAVENWORTH	82%	85%	87%	87%	95%	76%	89%	81%	86%
LINCOLN	100%	96%	100%	100%	100%	96%	88%	88%	92%
LINN	85%	86%	86%	85%	99%	79%	97%	91%	97%
LOGAN	98%	98%	98%	98%	100%	98%	100%	98%	98%
LYON	81%	80%	83%	82%	99%	76%	94%	84%	96%
MARION	84%	89%	84%	85%	95%	74%	90%	84%	87%
MARSHALL	96%	99%	98%	98%	99%	96%	99%	96%	98%
MCPHERSON	89%	88%	88%	87%	96%	84%	72%	69%	92%
MEADE	90%	85%	90%	90%	97%	80%	92%	85%	90%
MIAMI	90%	87%	90%	90%	98%	85%	57%	49%	88%
MITCHELL	93%	92%	93%	90%	96%	89%	95%	84%	95%
MONTGOMERY	92%	91%	96%	96%	99%	87%	27%	24%	28%
MORRIS	92%	90%	90%	92%	100%	87%	100%	95%	98%
MORTON	76%	72%	72%	68%	76%	68%	76%	72%	68%
NEMAHA	94%	94%	95%	95%	96%	90%	98%	95%	96%
NEOSHO	89%	85%	90%	90%	94%	83%	96%	27%	90%
NESS	82%	82%	82%	82%	100%	82%	96%	96%	100%
NORTON	97%	97%	97%	97%	100%	97%	100%	93%	100%
OSAGE	82%	87%	82%	81%	94%	74%	97%	81%	95%
OSBORNE	81%	81%	81%	81%	92%	81%	92%	77%	85%
OTTAWA	95%	96%	95%	96%	97%	91%	99%	83%	97%
PAWNEE	80%	80%	80%	80%	90%	70%	100%	100%	100%
PHILLIPS	83%	86%	83%	83%	95%	83%	95%	89%	92%
POTTAWATOMIE	91%	90%	90%	91%	99%	89%	98%	92%	97%
PRATT	94%	93%	93%	92%	99%	92%	99%	82%	97%
RAWLINS	100%	100%	100%	100%	100%	100%	94%	89%	94%
RENO	88%	89%	89%	88%	96%	85%	93%	83%	91%
REPUBLIC	73%	77%	73%	72%	97%	70%	97%	90%	93%
RICE	98%	99%	98%	96%	98%	95%	98%	88%	96%
RILEY	91%	90%	92%	92%	100%	88%	92%	83%	89%
ROOKS	96%	96%	96%	96%	100%	96%	98%	100%	100%
RUSH	92%	85%	92%	92%	92%	77%	92%	92%	92%
RUSSELL	96%	96%	98%	98%	98%	93%	96%	93%	99%
SALINE	93%	94%	93%	92%	99%	92%	96%	89%	85%
SCOTT	97%	100%	93%	97%	100%	93%	100%	97%	97%
SEDGWICK	92%	93%	90%	90%	95%	84%	92%	85%	91%
SEWARD	93%	94%	94%	94%	97%	90%	97%	82%	95%
SHAWNEE	84%	85%	84%	82%	97%	81%	96%	84%	94%
SHERIDAN	87%	87%	93%	93%	100%	83%	100%	97%	90%

COUNTY	DTaP5*	Polio4♦	MMR2	Var2	HepB3	5-4-2-2-3	Hib3§	PCV4§	HepA2§
STATEWIDE	**89%**	**89%**	**90%**	**89%**	**97%**	**84%**	**91%**	**81%**	**90%**
SHERMAN	90%	90%	93%	93%	100%	86%	97%	90%	93%
SMITH	98%	93%	98%	98%	100%	93%	95%	85%	98%
STAFFORD	91%	91%	91%	91%	97%	91%	91%	88%	91%
STANTON	76%	72%	72%	68%	100%	68%	100%	84%	92%
STEVENS	95%	91%	92%	92%	100%	88%	92%	85%	99%
SUMNER	86%	87%	87%	87%	92%	80%	89%	78%	92%
THOMAS	97%	96%	97%	97%	98%	94%	99%	96%	100%
TREGO	97%	97%	97%	97%	100%	93%	93%	87%	100%
WABAUNSEE	88%	86%	88%	85%	95%	83%	92%	88%	92%
WALLACE	60%	67%	67%	62%	93%	53%	90%	63%	87%
WASHINGTON	93%	95%	93%	93%	100%	92%	97%	92%	93%
WICHITA	100%	100%	96%	96%	100%	96%	96%	81%	96%
WILSON	98%	98%	96%	96%	97%	93%	97%	83%	95%
WOODSON	100%	100%	100%	100%	100%	97%	97%	90%	100%
WYANDOTTE	86%	85%	89%	87%	96%	78%	86%	75%	92%

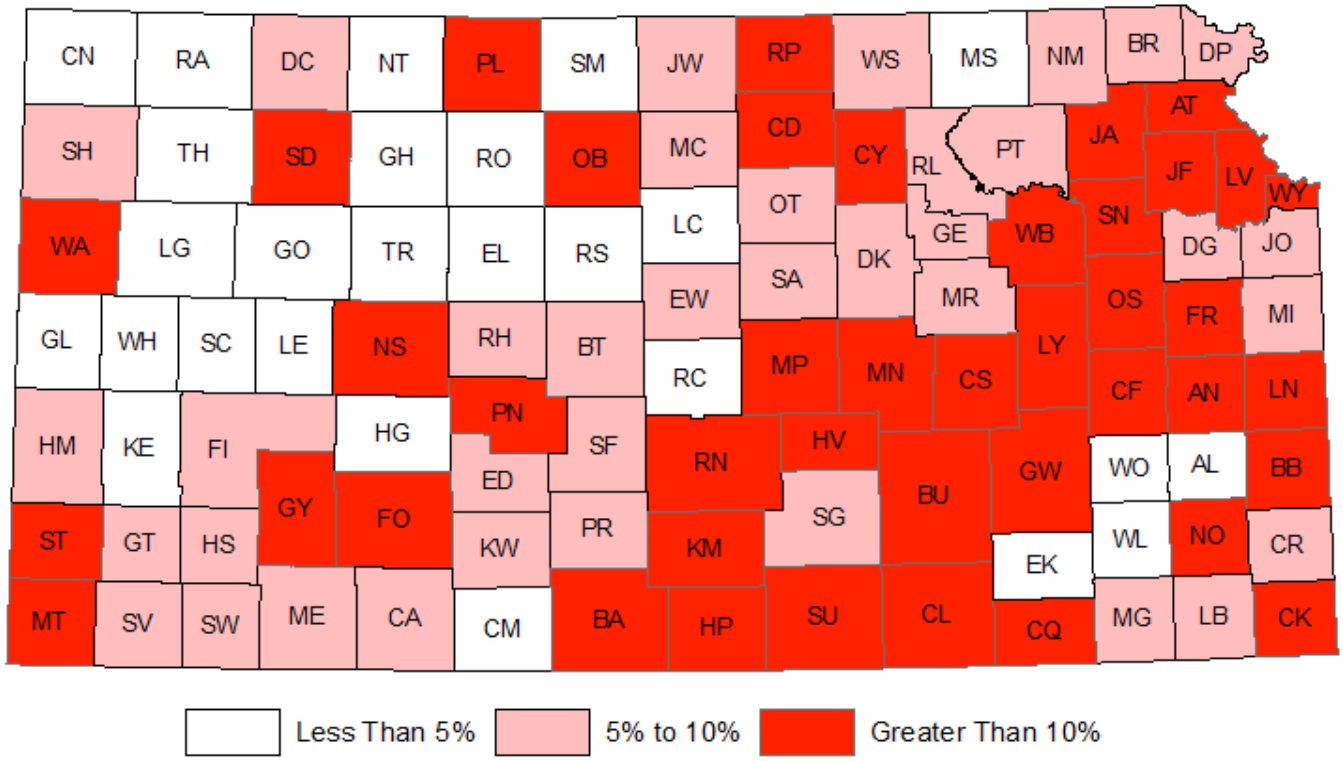
§ Hib3, HepA2, and PCV4 are not required for school entry; therefore, they may not consistently be reported on the vaccination record thus decreasing coverage levels for the individual vaccines. This is evident for several counties that have extremely low levels for the Hib3, HepA2 and PCV4 coverage levels.
*5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday.
♦4 doses of Polio or 3 doses if 3rd is administered on or after the fourth birthday.

Appendix 2: Maps of unvaccinated kindergarteners by vaccine – Kansas, 2017-2018

MMR2

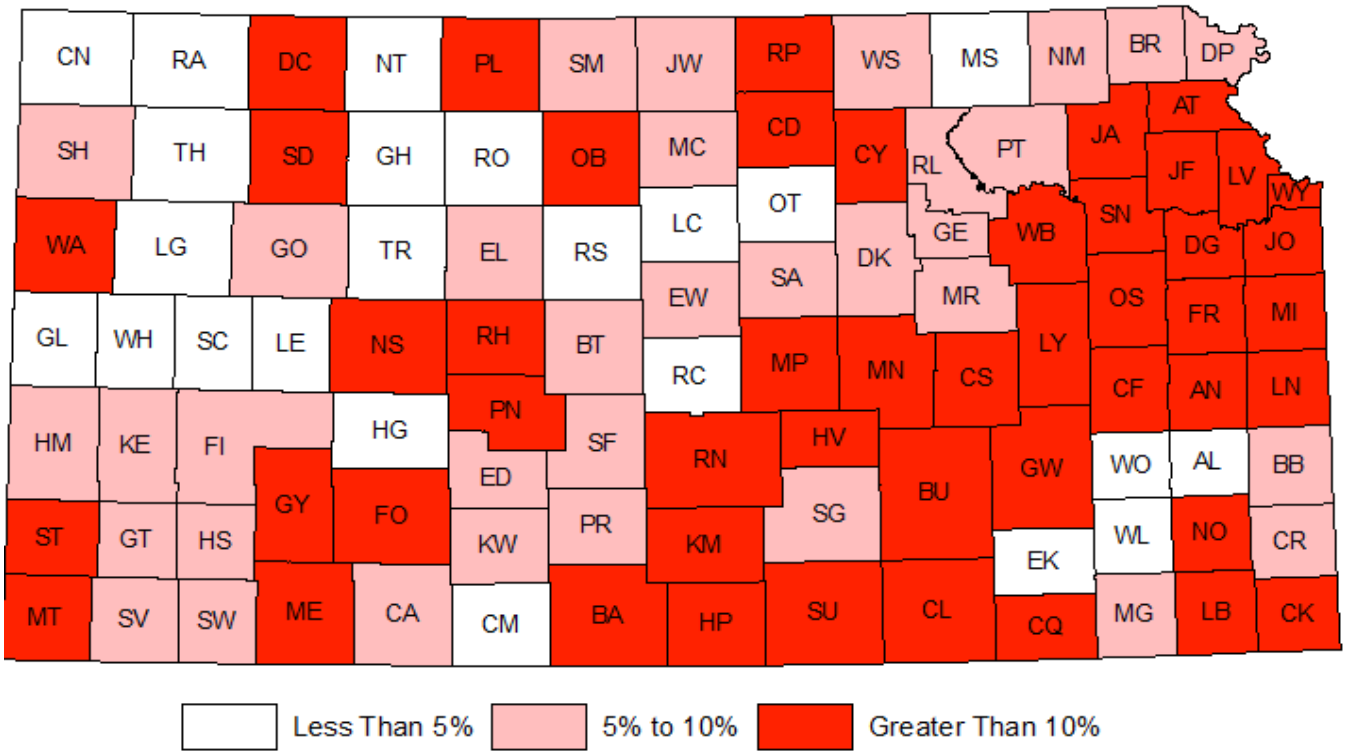


DTaP5



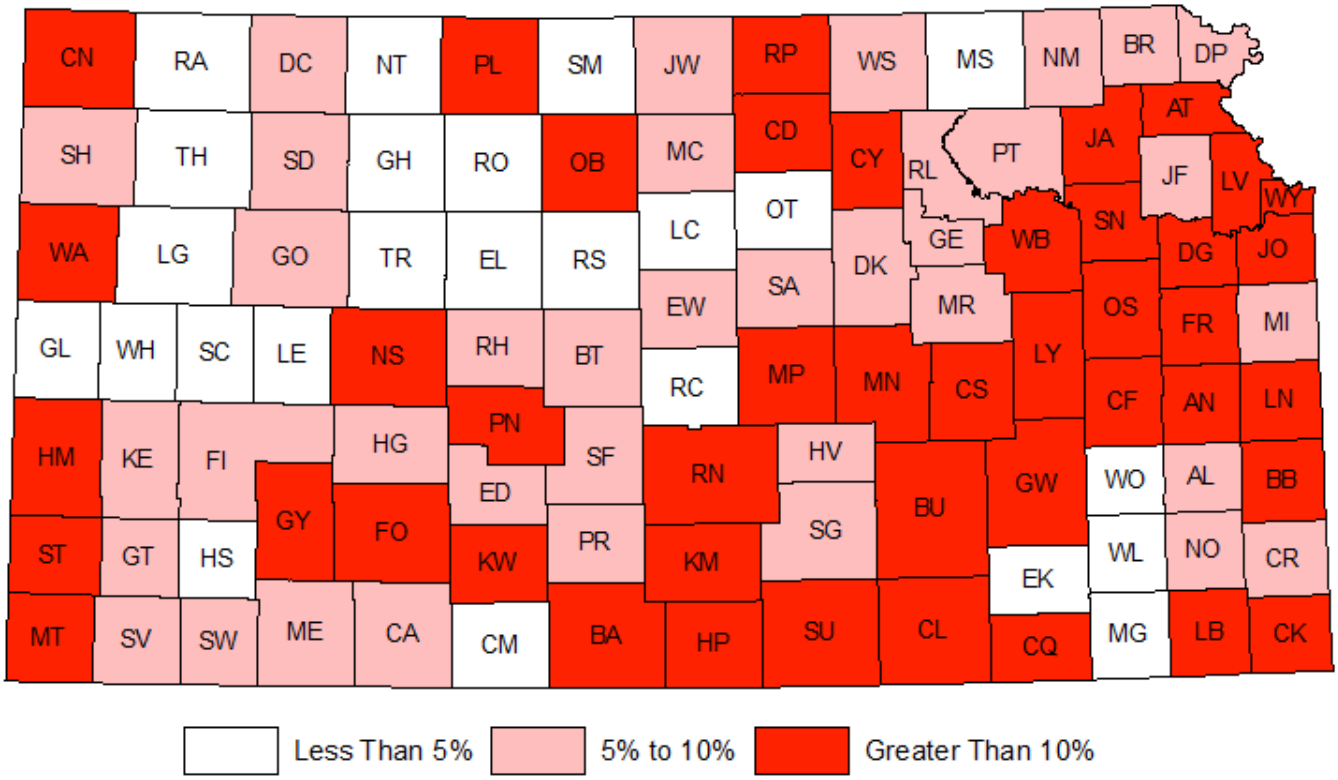
5 doses of DTaP or 4 doses if the fourth is administered on or after the fourth birthday

Polio4

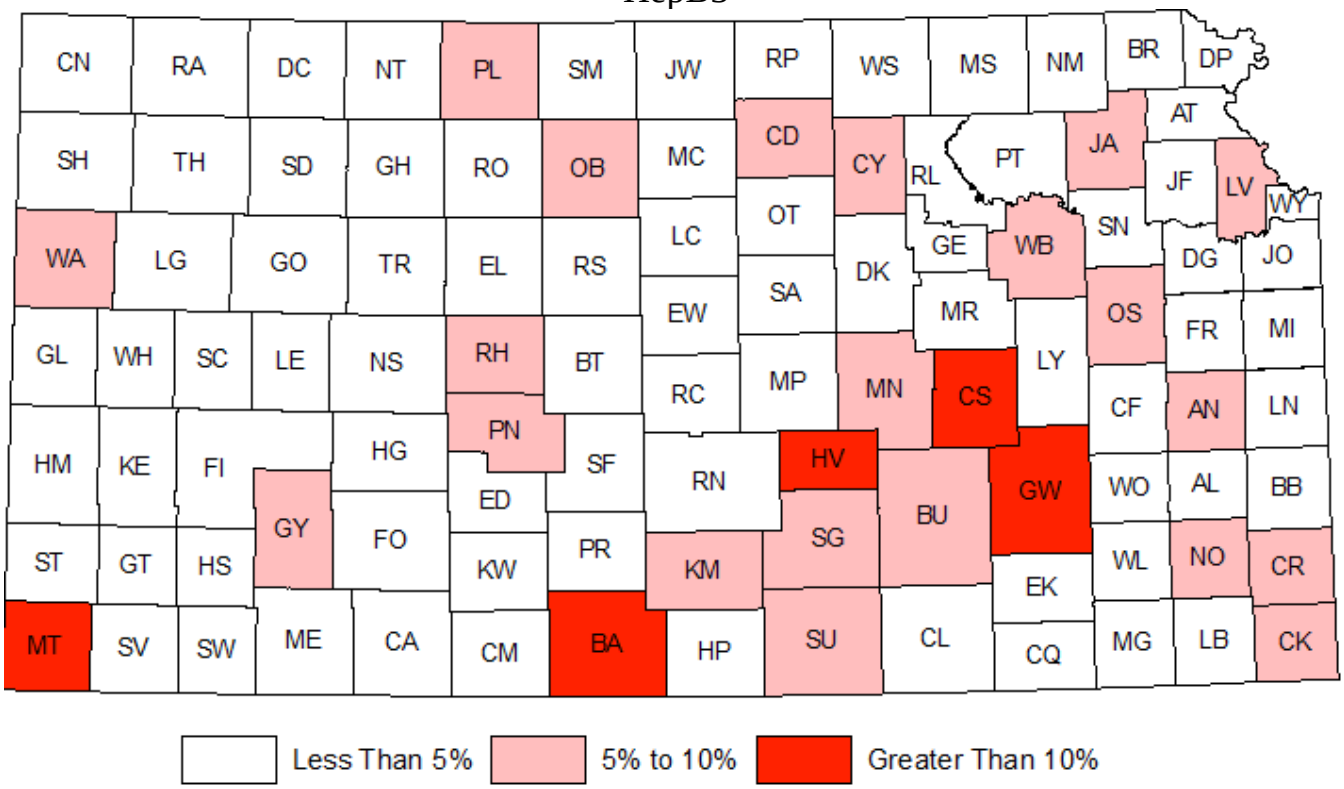


4 doses of Polio or 3 doses if the third is administered on or after the fourth birthday

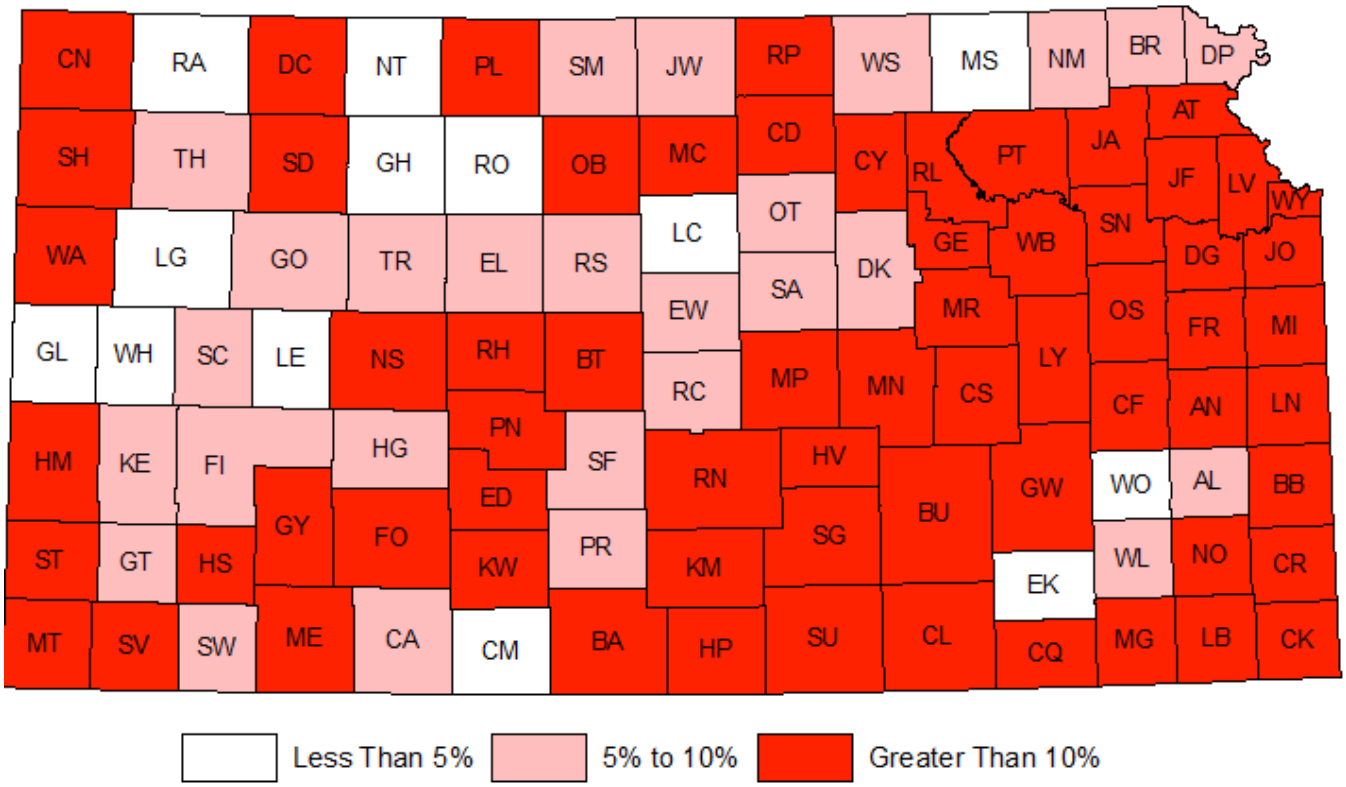
Var2



HepB3



5-4-2-2-3 series



Appendix 3: Average vaccine exemption rates by exemption type and county – Kansas, 2017-2018

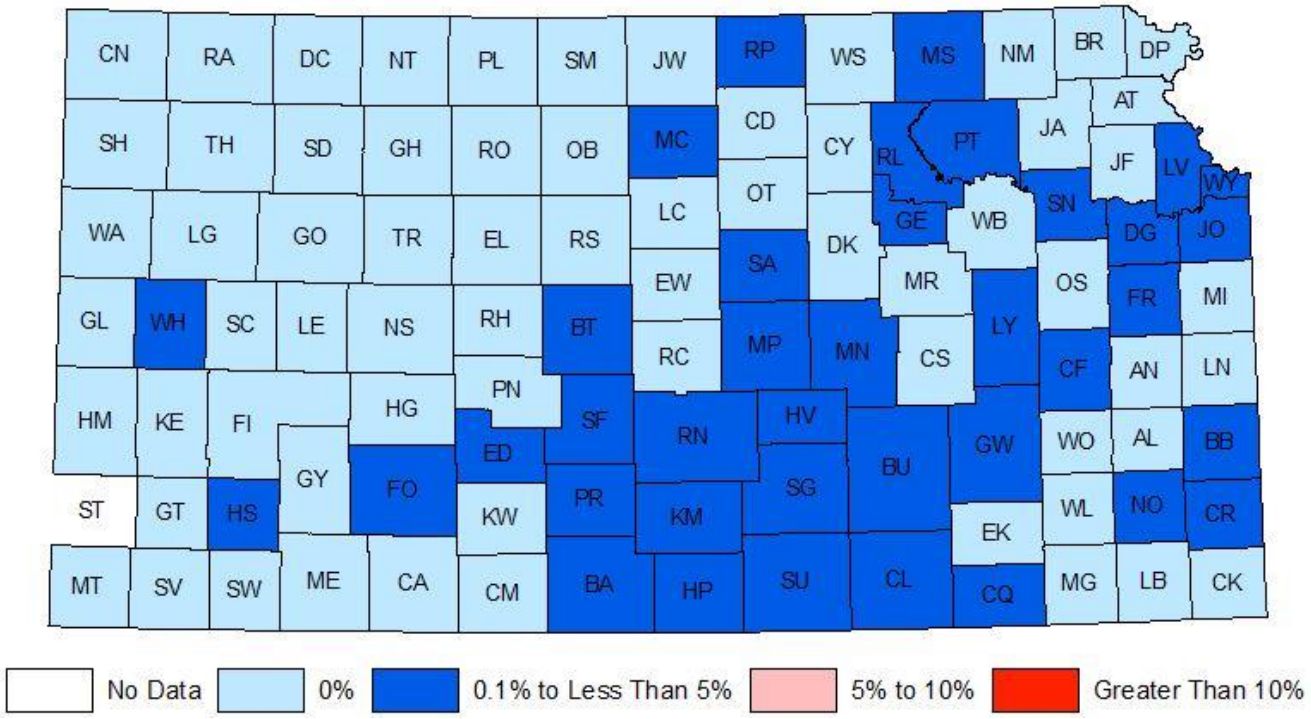
COUNTY	Total Exemption	Religious Exemption	Medical Exemption
STATEWIDE	**1.9%**	**1.5%**	**0.4%**
ALLEN	0.7%	0.7%	0.0%
ANDERSON	7.6%	7.6%	0.0%
ATCHISON	0.0%	0.0%	0.0%
BARBER	5.7%	3.8%	1.9%
BARTON	2.7%	2.4%	0.3%
BOURBON	5.6%	4.0%	1.7%
BROWN	1.6%	1.6%	0.0%
BUTLER	2.6%	2.5%	0.1%
CHASE	2.9%	2.9%	0.0%
CHAUTAUQUA	2.7%	0.0%	2.7%
CHEROKEE	0.4%	0.4%	0.0%
CHEYENNE	2.9%	2.9%	0.0%
CLARK	0.0%	0.0%	0.0%
CLAY	1.0%	1.0%	0.0%
CLOUD	5.9%	5.9%	0.0%
COFFEY	3.3%	2.2%	1.1%
COMANCHE	0.0%	0.0%	0.0%
COWLEY	1.2%	1.0%	0.2%
CRAWFORD	1.1%	0.6%	0.4%
DECATUR	3.6%	3.6%	0.0%
DICKINSON	0.9%	0.9%	0.0%
DONIPHAN	1.0%	1.0%	0.0%
DOUGLAS	1.8%	1.6%	0.2%
EDWARDS	3.0%	0.0%	3.0%
ELK	0.0%	0.0%	0.0%
ELLIS	1.2%	1.2%	0.0%
ELLSWORTH	0.0%	0.0%	0.0%
FINNEY	0.8%	0.8%	0.0%
FORD	0.7%	0.3%	0.3%
FRANKLIN	2.1%	1.8%	0.3%
GEARY	1.6%	1.1%	0.5%
GOVE	2.9%	2.9%	0.0%
GRAHAM	0.0%	0.0%	0.0%
GRANT	0.0%	0.0%	0.0%
GRAY	1.2%	1.2%	0.0%
GREELEY	0.0%	0.0%	0.0%
GREENWOOD	5.9%	4.4%	1.5%
HAMILTON	1.3%	1.3%	0.0%
HARPER	1.6%	0.0%	1.6%
HARVEY	2.8%	2.6%	0.3%
HASKELL	2.1%	0.0%	2.1%
HODGEMAN	0.0%	0.0%	0.0%
JACKSON	1.8%	1.8%	0.0%
JEFFERSON	1.5%	1.5%	0.0%

COUNTY	Total Exemption	Religious Exemption	Medical Exemption
STATEWIDE	**1.9%**	**1.5%**	**0.4%**
JEWELL	0.0%	0.0%	0.0%
JOHNSON	2.6%	2.2%	0.4%
KEARNY	1.3%	1.3%	0.0%
KINGMAN	1.8%	0.0%	1.8%
KIOWA	0.0%	0.0%	0.0%
LABETTE	1.6%	1.6%	0.0%
LANE	0.0%	0.0%	0.0%
LEAVENWORTH	1.2%	0.9%	0.3%
LINCOLN	4.0%	4.0%	0.0%
LINN	1.9%	1.9%	0.0%
LOGAN	0.0%	0.0%	0.0%
LYON	0.6%	0.3%	0.3%
MARION	0.8%	0.0%	0.8%
MARSHALL	0.6%	0.0%	0.6%
MCPHERSON	3.7%	2.8%	0.9%
MEADE	2.0%	2.0%	0.0%
MIAMI	1.3%	1.3%	0.0%
MITCHELL	3.6%	2.4%	1.2%
MONTGOMERY	0.4%	0.4%	0.0%
MORRIS	1.9%	1.9%	0.0%
MORTON	9.1%	9.1%	0.0%
NEMAHA	0.9%	0.9%	0.0%
NEOSHO	1.2%	0.6%	0.6%
NESS	0.0%	0.0%	0.0%
NORTON	0.0%	0.0%	0.0%
OSAGE	0.0%	0.0%	0.0%
OSBORNE	0.0%	0.0%	0.0%
OTTAWA	1.3%	1.3%	0.0%
PAWNEE	7.1%	7.1%	0.0%
PHILLIPS	13.7%	13.7%	0.0%
POTTAWATOMIE	4.6%	4.2%	0.4%
PRATT	3.2%	1.6%	1.6%
RAWLINS	5.3%	5.3%	0.0%
RENO	2.9%	2.4%	0.5%
REPUBLIC	2.4%	0.0%	2.4%
RICE	4.2%	4.2%	0.0%
RILEY	1.0%	0.9%	0.2%
ROOKS	0.0%	0.0%	0.0%
RUSH	0.0%	0.0%	0.0%
RUSSELL	1.0%	1.0%	0.0%
SALINE	1.4%	0.9%	0.5%
SCOTT	0.0%	0.0%	0.0%
SEDGWICK	1.8%	1.3%	0.5%
SEWARD	0.3%	0.3%	0.0%
SHAWNEE	1.2%	0.9%	0.4%
SHERIDAN	0.0%	0.0%	0.0%
SHERMAN	4.1%	4.1%	0.0%

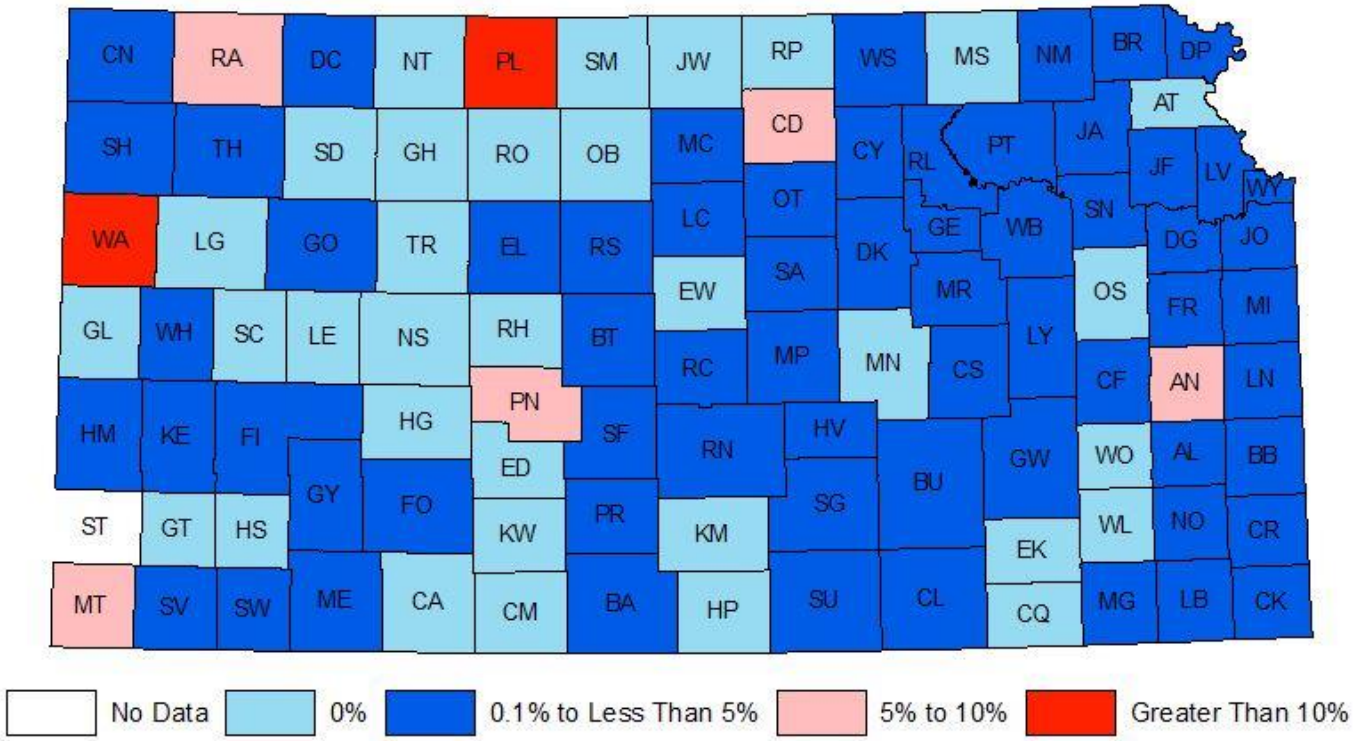
COUNTY	Total Exemption	Religious Exemption	Medical Exemption
STATEWIDE	**1.9%**	**1.5%**	**0.4%**
SMITH	0.0%	0.0%	0.0%
STAFFORD	3.6%	1.8%	1.8%
STANTON	Did not respond	Did not respond	Did not respond
STEVENS	2.0%	2.0%	0.0%
SUMNER	2.6%	1.9%	0.7%
THOMAS	2.2%	2.2%	0.0%
TREGO	0.0%	0.0%	0.0%
WABAUNSEE	2.7%	2.7%	0.0%
WALLACE	13.3%	13.3%	0.0%
WASHINGTON	1.1%	1.1%	0.0%
WICHITA	1.9%	1.0%	1.0%
WILSON	0.0%	0.0%	0.0%
WOODSON	0.0%	0.0%	0.0%
WYANDOTTE	0.9%	0.7%	0.1%

Appendix 4: Maps of vaccine exemptions by exemption type – Kansas, 2017-2018

Medical Exemptions



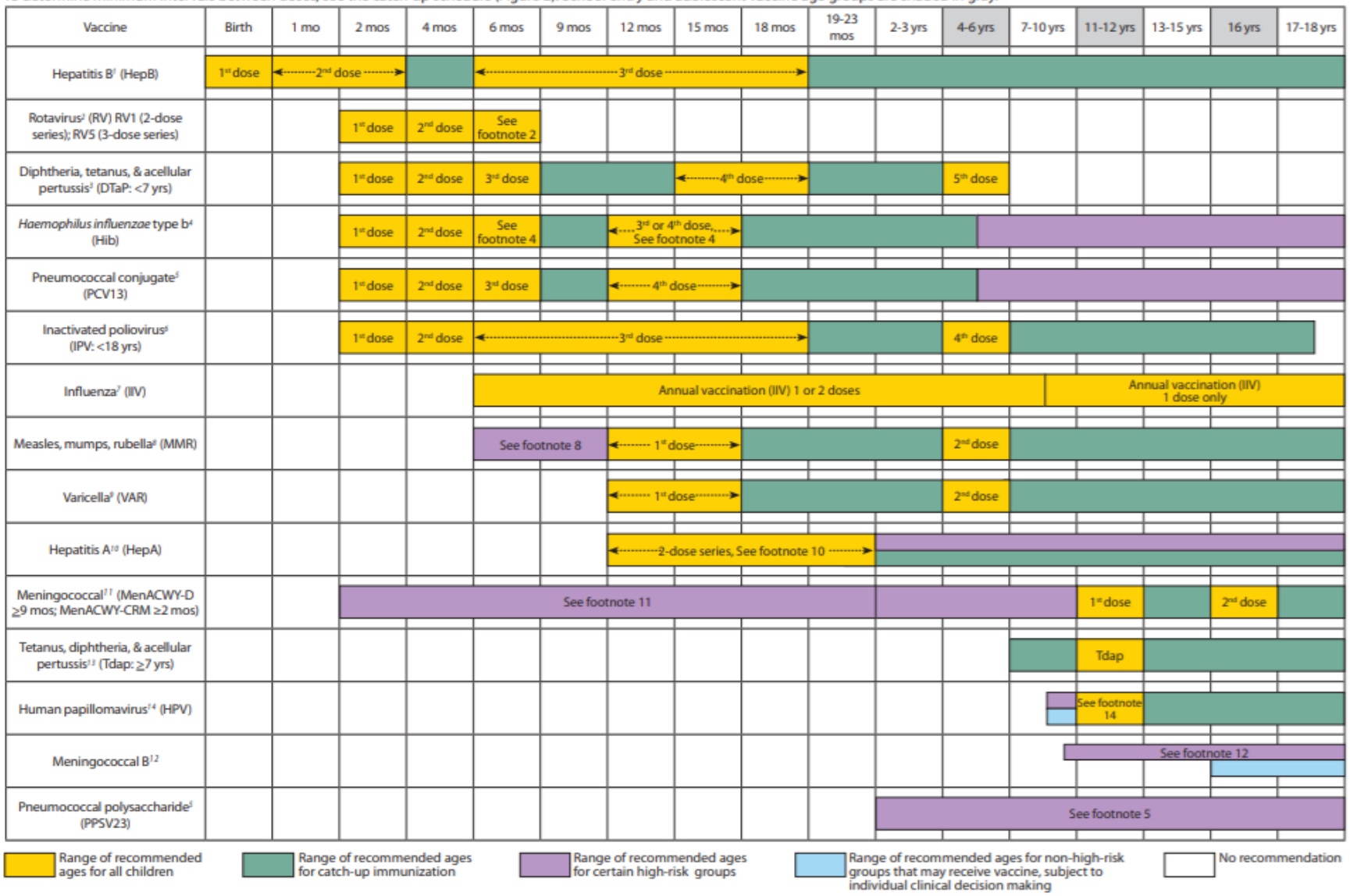
Religious Exemptions



Appendix 5: ACIP Immunization Schedule Recommendation for Children and Adolescents

Recommendations https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf

Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2018.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.