



# ONE HEALTH KNOWLEDGE ASSESSMENT, CURRICULUM DEVELOPMENT, AND EVALUATION FOR MIDDLE SCHOOL STUDENTS

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FIELD EXPERIENCE REPORT

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# Outline

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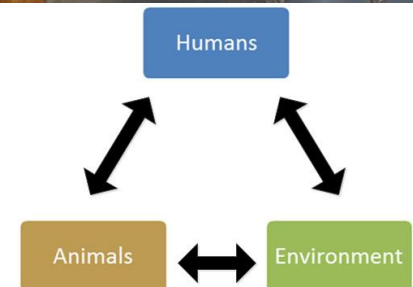


# Relevant and Applied MPH Courses

- Statistical Methods for Nat. Sciences: STAT703
- Environmental Toxicology: DMP806
- Disease Epidemiology: DMP854
- Prin. and Meth. of Epidemiology: DMP708
- Admin. of Health Care Organizations: HMD720
- Soc. and Behavioral Basis of PH:KIN818
- Multidisc. Thought and Writing: DMP815
- Multidisc Overview FS/Security: FDSCI730

# Introduction

- Public Health improves the health and well-being of people through prevention
- “One Health is the collaborative effort of multiple disciplines – working locally, nationally, and globally – to attain optimal health for people, animals and our environment.”
  - American Veterinary Medical Association
- Education is the knowledge and development resulting from systematic instruction



# Organizations that Promote One Health



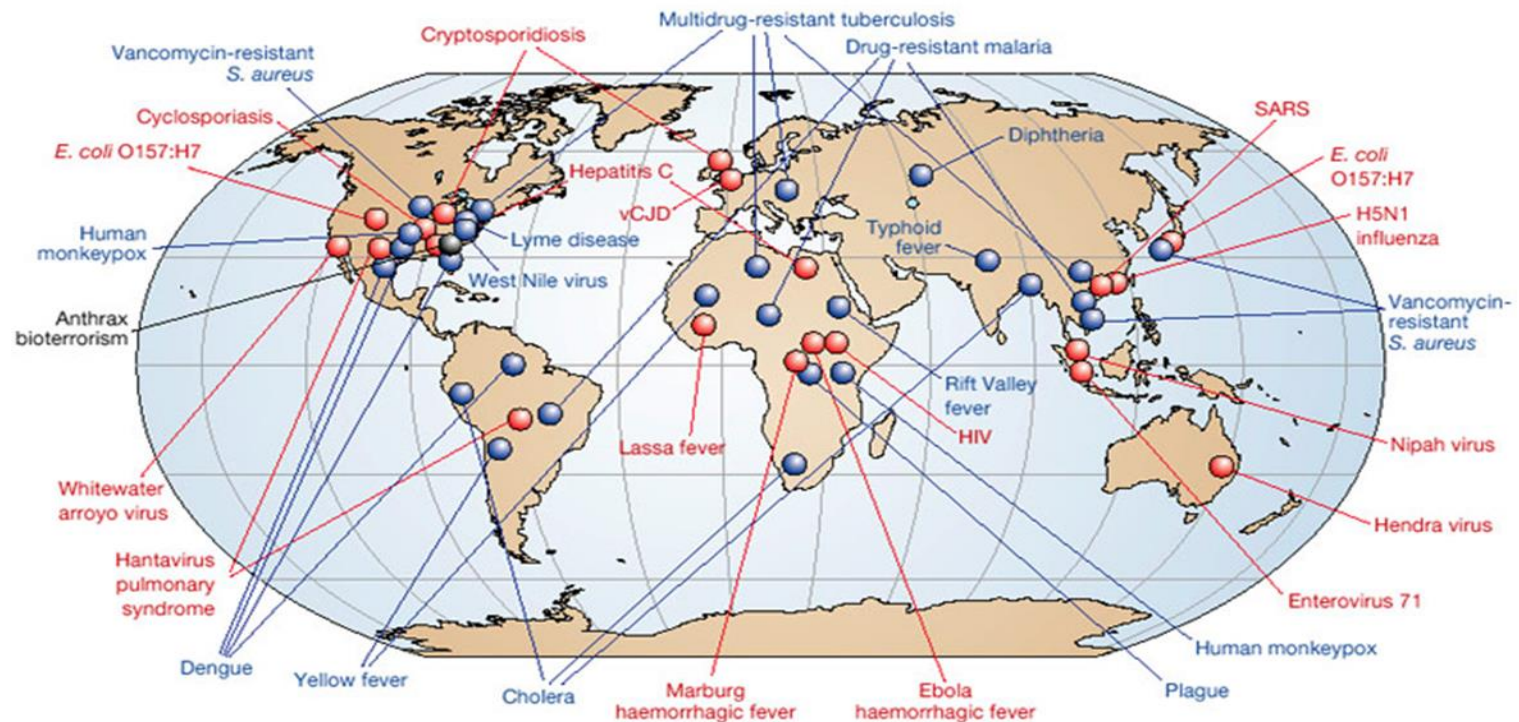


# Reasons to Promote One Health

- Major part of public health
- Human-animal interactions are important to health
- Spread of zoonotic diseases
- Foodborne illnesses
- Animal bite prevention
- Animals can serve as models and sentinels of disease
- Natural and human-caused environmental changes affect human and animal health

# Emerging Diseases

60% of diseases currently recognized in humans are due to pathogens that affect multiple species  
Approximately, 75% of emerging human infectious diseases are diseases of animal origin



Source: NATURE; Vol 430; July 2004 [www.nature.com/nature](http://www.nature.com/nature)



# Purpose

- Assess the One Health concept knowledge of middle school students
- Assess the need for the development of a One Health curriculum for middle school students
- Determine if a relative difference in the demographics of a school affects the One Health knowledge level of the students





# Study Design

- One Health Knowledge Assessment
  - Topics for One Health lesson
  - Difficulty of subject matter
  - Interest in One Health concepts
  - Web-based, multiple choice, 21-question survey
- Two middle schools
  - Ft. Riley USD 475 and Indian Woods USD 512
  - Differing socio-economic profiles

# Study Design (cont.)

- One Health topics included in knowledge assessment:
  - One Health
  - Handwashing
  - Dog bites and prevention
  - Zoonotic disease definition
  - Zoonotic disease transmission and prevention
  - Rabies
  - Foodborne illness and food safety
  - Human-animal bond
  - Disease spread due to environmental changes



# One Health Lesson

- Results of the knowledge assessment were used to develop the One Health lesson
- Topics were included if students performed below 50%
  - Zoonotic disease transmission
  - Zoonotic disease prevention while outdoors
  - Rabies and rabies prevention
  - Dog bite prevention
  - Role of deforestation in disease transmission

# One Health Lesson (cont.)


- Face-to-face lesson
- 25 minutes in length
- Presented during normal class periods
  - Family and consumer science
  - Science
- Best part of the whole study 😊
- Students were very interested





# Methods

- Participants
  - Grades 6-8, male and female, multiple races
  - One Health Knowledge Assessment survey (198)
    - 68 USD 475 students during a physical education class (6<sup>th</sup> - 8<sup>th</sup> grade)
    - 130 USD 512 students during a science class (7<sup>th</sup> grade)
  - One Health lesson, pre- and post-lesson survey (292)
    - 84 USD 475 students in a family and consumer science class (6<sup>th</sup> - 8<sup>th</sup> grade)
    - 208 USD 512 students in a science class (7<sup>th</sup> grade)



# Fort Riley USD 475 Demographics

- Total students: 643
- Male 52% and female 48%
- White 49% and non-white 39%
- Free lunch 32%
- Reduced-price lunch 31%



# Indian Woods USD 512 Demographics

- Total students: 696
- Male 53% and female 47%
- White 71% and non-white 29%
- Free lunch 21%
- Reduced-price lunch 9%



# Survey Methodology

- Knowledge assessment survey
  - 21 multiple-choice questions
    - 1 grade level question
    - 18 One Health topic questions
    - 2 qualitative assessment questions
      - Difficulty and interest in subject matter
- Pre- and post-lesson survey
  - 12 multiple choice questions
    - 1 grade level question
    - 9 One Health topic questions
    - 2 qualitative assessment questions
      - Difficulty and interest in subject matter





# Development and Implementation of One Health Knowledge Surveys and Lesson

- IRB approved
- Informed consent
- Students were debriefed about purpose of survey
- No demographic information gathered except for grade level
- Axio survey used



# Development and Implementation of One Health Knowledge Surveys and Lesson (cont.)

- One Health topics important to students' health
- Questions vetted by researchers
- Results of knowledge assessment used to develop lesson and pre- and post lesson survey

# Data Analysis

- Pre- and post-lesson survey
  - Gain of learning  $g = \frac{(\text{Post-assessment} - \text{Pre-assessment})}{(100\% - \text{Pre-assessment})}$
  - Paired  $t$ -test  $t = \frac{\sum d}{\sqrt{(n(\sum d^2) - (\sum d)^2 / n - 1)}}$
  - Student  $t$ -test  $t = \frac{X_1 - X_2}{S_{X_1X_2} \cdot \sqrt{(1/n_1 + 1/n_2)}}$ 
    - *(unequal sample size)*

Each answer of the multiple choice questions that had multiple correct answers due to the “all that apply” options were turned into a binary as a correct or incorrect answer which changed the total number of questions from 21 to 61 for the knowledge assessment and 12 to 49 for the pre-and post lesson survey

# Results

## One Health Knowledge Assessment

Total questions (61)	Total # of Questions Answered Correctly	
	#	%
Mean	43	70%
Standard Deviation	6	

Total students (198)

# Results

## One Health Knowledge Assessment (cont.)

Students' performance on difficult topics (below 50% success rate)

Topics	% correct
Dog bite prevention	34%
Transmission of zoonotic diseases	40%, 21%
Percentage of new human infectious diseases originating in animals	9%
What is rabies	49%
Rabies prevention	47%, 41%
Outdoor protection from illness and disease	27%
Environmental change affecting spread of diseases	30%, 48%

# Results

## Qualitative Data for One Health Knowledge Assessment (cont.)

Difficulty	Frequency	%	Interest	Frequency	%
Very	11	6%	Very	49	25%
Moderate	33	17%	Moderate	49	25%
Somewhat	67	34%	Somewhat	58	30%
Slightly	63	32%	Slightly	29	15%
Not at all	21	11%	Not at all	10	5%

# Pre- and Post-lesson Survey Data

Total questions (49)	Total # of Questions Answered Correctly	
	Pre-lesson	Post-lesson
Mean	36, 73%	41, 84%
Standard Deviation	6	6

Total students (292)

$$g = 0.42 \pm 0.09$$

Mean values are significantly different by paired t-test,  $t(582) = -12.1$ ,  $p < .0001$

# Results

## Qualitative Data for Pre-lesson Survey

Difficulty	Frequency	%	Interest	Frequency	%
Very	42	14%	Very	16	5%
Moderate	102	35%	Moderate	47	16%
Somewhat	104	36%	Somewhat	81	28%
Slightly	39	13%	Slightly	92	32%
Not at all	4	1%	Not at all	55	19%





# Results

## Qualitative Data for Post-lesson Survey

Difficulty	Frequency	%	Interest	Frequency	%
Very	128	44%	Very	15	5%
Moderate	98	34%	Moderate	47	16%
Somewhat	52	18%	Somewhat	69	24%
Slightly	10	3%	Slightly	79	27%
Not at all	3	1%	Not at all	80	27%

# Ft. Riley & Indian Woods Middle School Pre- vs. Post-lesson Survey Comparison by School

Total questions (49)	Ft. Riley Middle School Questions Answered Correctly (84 Participants)		Indian Woods Middle School Questions Answered Correctly (208 participants)	
	Pre-lesson	Post-lesson	Pre-lesson	Post-lesson
<b>Mean</b>	35, 71%	41, 85%	36, 73%	41, 84%
<b>Standard Deviation</b>	6	6	6	6

**USD 475 mean values were significantly different by paired t-test,  $t(166)=-7.51, p < .0001$**   
**USD 512 mean values were significantly different by paired t-test,  $t(414)= -9.64, p < .0001$**

# Ft. Riley vs. Indian Woods Middle School Pre- & Post-lesson Survey Comparison between Schools

Total questions (49)	Ft. Riley Middle School Questions Answered Correctly (84 participants)		Indian Woods Middle School Questions Answered Correctly (208 participants)	
	Pre-lesson	Post-lesson	Pre-lesson	Post-lesson
Mean	35, 71%	41, 85%	36, 73%	41, 84%
Standard Deviation	6	6	6	6

USD 475 pre vs. USD 512 pre  $t(290) = -0.933, p = 0.350$ ; No significant difference by student's t test  
 USD 475 post vs. USD 512 post  $t(290) = 0.152, p = 0.872$ , No significant difference by student's t test

# Ft. Riley vs. Indian Woods Middle School Gain of Learning

Total questions (49)	Ft. Riley Middle School (84 participants)	Indian Woods Middle School (208 participants)
	Gain of Learning	Gain of Learning
Mean	0.44	0.41
Standard Deviation	0.29	0.30

No significant difference in mean gain of learning scores by the student's t-test  $t(290)=0.727$ ,  $p=0.471$  USD 475  $g = 0.44 \pm 0.09$ , USD 512  $g = 0.41 \pm 0.09$  ( $p > .05$ )



# Discussion

- Ft. Riley Middle School (enrollment: 643), a military base school
- Indian Woods Middle School (enrollment: 696), a suburban, public school
- Ft. Riley is more diverse and of a lower socio-economic status than Indian Woods
- Interest in One Health topics could lead to a career in public health
- Greater than 60% of students correctly answered questions on most One Health topics

# Discussion (cont.)

- Students demonstrated overall proficiency in the following areas:
  - Definition of One Health
  - Hand washing
  - Zoonotic diseases
  - Food safety

# Discussion (cont.)

- On average students scored less than 50% on the following topics on the One Health lesson:
  - Dog bite prevention
  - How zoonotic diseases are spread
  - What percentage of new infectious diseases in humans originate in animals
  - What is rabies
  - How to prevent rabies
  - Environmental changes affecting the spread of diseases
  - Ways to avoid getting an illness or disease while outdoors

# Discussion (cont.)

- Proved that they could learn more difficult One Health topics by achieving  $g= 0.42$  (11% increase in pre- to post-lesson survey score)
- Indicated that a standardized One Health curriculum is needed and would improve the students' knowledge of One Health
- No difference in One Health knowledge bases for students from these two schools reflecting a different socio-economic profile





# Conclusion

- Early promotion of One Health topics can impact health knowledge
- Middle school students have the ability to grasp One Health topics which could impact their health
- Students gained One Health knowledge that will likely impact their health and the health of their families and communities
- More research is needed on a broader socio-economic scale and in more diverse areas (urban/suburban/rural) to support the need for more One Health promotion and education in KS and nation-wide



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# Questions?

Thank you for your attention!



# Data Analysis

- Knowledge assessment and Pre- & post- lesson survey
  - Multiple choice answers converted into a binary (correct or incorrect)
  - Calculated:
    - Total correct answers per student and per question
    - Percent correct answers per student and per student and per question
    - Average correct, maximum correct, minimum correct, and median correct
  - Qualitative questions
    - Frequency and percentage of each answer calculated

# Results

## One Health Knowledge Assessment (cont.)

Students' performance on difficult topics (below 50% success rate)

Topics	Question	% correct
Dog bite prevention	7d	34%
Transmission of zoonotic diseases	10c, 10e	40%, 21%
Percentage of new human infectious diseases originating in animals	11	9%
What is rabies	12	49%
Rabies prevention	13c, 13e	47%, 41%
Outdoor protection from illness and disease	16c	27%
Environmental change affecting spread of diseases	17a, 17c	30%, 48%

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# Fort Riley USD 475 Demographics

Grade	Total all	Total M/F	White M/F	Black M/F	Hispanic M/F	Free Lunch	Reduced- Price Lunch	Special Educ.
6	239	129/110	62/57	27/21	27/23	47/34	41/37	26/<10*
7	207	116/91	51/46	29/16	23/17	39/26	35/31	24/<10*
8	197	94/103	55/50	16/20	16/19	28/34	28/30	19/11
Total		339/304	168/153	72/57	66/59	114/94	104/98	69/N/A*
Grand Total		643	321	129	125	208	202	<100
%			49%	20%	19%	32%	31%	<15%

**Free Lunch 208/643=32%**

**Reduced-Price Lunch 238/643= 31%**

Source: <http://svapp15586.ksde.org/k12/k12.aspx>

# Indian Woods USD 512 Demographics

Grade	Total all	Total M/F	White M/F	Black M/F	Hispanic M/F	Free Lunch	Reduced-Price lunch	Special Educ.
7	364	191/173	142/122	15/<10*	26/26	37/34	15/19	22/12
8	332	179/153	132/102	10/14	29/24	40/37	14/10	30/<10*
Total USD	696	370/326	274/224	25/N/A*	55/50	77/71	29/29	52/N/A*
Grand Total		696	498	<50	105	148	58	<74
%			71%	<7%	15%	21%	8%	<10%

**Free Lunch 148/696 = 21%**

**Reduced-Price Lunch 58/696 = 8%**

\*The Family Educational Rights and Privacy Act (FERPA) prevent the disclosure of personally identifiable student information. KSDE has determined that any quantities less than 10 maybe personally identifiable.

Source: <http://svapp15586.ksde.org/k12/k12.aspx>



# Results

## One Health Knowledge Assessment

Total students (198)	Total Correct Questions (61)	
	#	%
Mean	43	70%
Max	59	97%
Min	21	34%
Median	44	72%

# Pre- and Post-lesson Survey Data

Total questions (49)	Total Correct Answer	
	Pre-lesson	Post-lesson
Total students (292)		
Mean	36 73%	41 84%
Max	46 94%	49 100%
Min	14 29%	10 20%
Median	37 76%	43 88%
STDEV	6	6

$$g = 0.42 \pm 0.09$$

Mean values are significantly different by Paired t-test,  $t(582) = -12.1$ ,  $p < .0001$ )

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<b>Max</b>	46 94%	48 98%	46 94%	49 100%
<b>Min</b>	19 39%	21 43%	14 29%	10 20%
<b>Median</b>	37 74%	43 88%	37 76%	43 88%
<b>STDEV</b>	6	6	6	6

FR mean values were significantly different by Paired t-test,  $t(166)=-7.51$ ,  $p < .0001$

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Min	19 39%	21 43%	14 29%	10 20%
Median	37 74%	43 88%	37 76%	43 88%
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