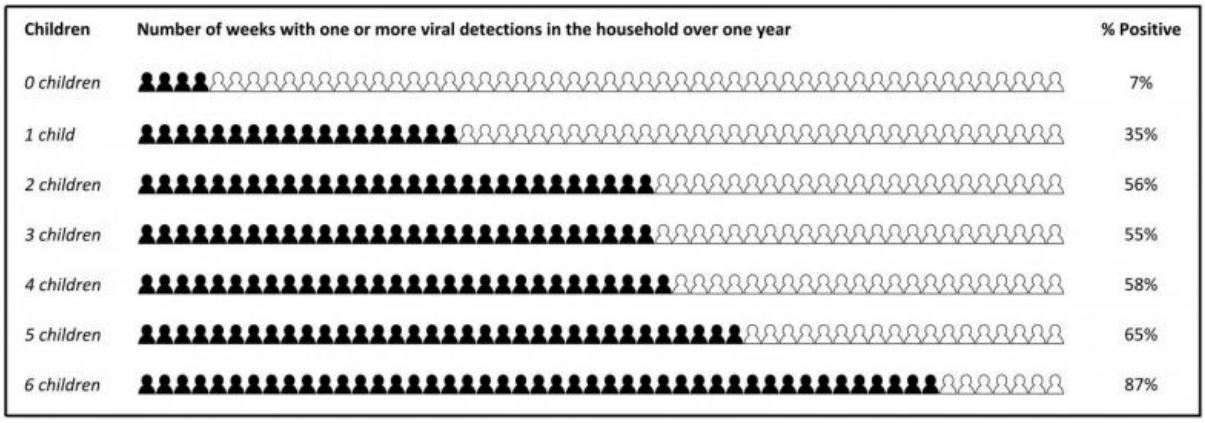
Viruses thrive in big families, in sickness and in health

August 5 2015



The BIG-LoVE (Utah Better Identification of Germs-Longitudinal Viral Epidemiology) study by investigators at the University of Utah School of Medicine shows that every child increases the risk that a household will be infected with respiratory virus. At one extreme, childless households are only sick for 7 percent of the year (3-4 weeks). By contrast, families with 6 children are sick for 87 percent of the year (45 weeks). Credit: University of Utah School of Medicine

The BIG LoVE (Utah Better Identification of Germs-Longitudinal Viral Epidemiology) study, led by scientists at the University of Utah School of Medicine, finds that each bundle of joy puts the entire household at increased risk for infection with viruses that cause colds, flu, and other respiratory illnesses.

People living in childless households were infected with viruses on average 3-4 weeks during the year. In households with one child, that number jumped to 18 weeks, and for those with six children, there was virus in the household for up to 45 weeks out of the year.

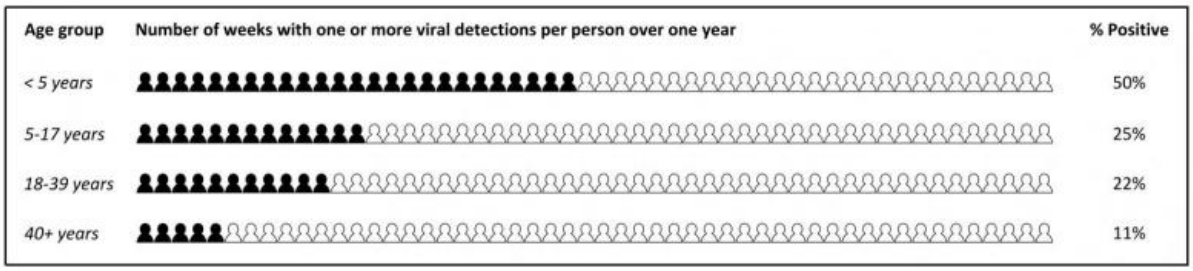
Yet on average only half of those who tested positive for viral infection also had the typical symptoms of coughing, fever, and stuffy nose, an informative finding for both families and their health care providers. The results were published in the journal, *Clinical Infectious Diseases*.

Kids Fill Hearts With Love, And Homes With Illness

When it comes to explaining why big families have more illnesses, all signs point to young kids as the culprits. Tots younger than five had at least one virus detected in their nasal mucus for 50 percent of the year: twice as often as older children and adults. And when infected, they were 1.5 times more likely to have symptoms, including severe ones like wheezing and fever.

Adding even more stress to a household, young kids didn't suffer alone. Their parents were sick 1.5 times more frequently than similarly aged adults who did not live with young kids.

"A lot families go through wave after wave of illness. In fact, some of the kids we monitored had symptoms for 20 to 25 weeks in a row," says co-first author Carrie Byington, M.D., professor of pediatrics and co-director of the Utah Center for Clinical and Translational Science. "This study helps us to understand what is normal in young children, and can help us determine when illness should be a cause for concern."



The BIG-LoVE (Utah Better Identification of Germs-Longitudinal Viral Epidemiology) study by investigators at the University of Utah School of Medicine shows that when it comes to explaining why big families are prone to illness, signs point to young kids as the culprits. Children younger than five were infected with respiratory virus for 50 percent of the year: twice as often as older children and adults. When infected, they were 1.5 times more likely to have symptoms, including severe symptoms like wheezing and fever. Credit: Carrie Byington, University of Utah School of Medicine

It's no secret that children get sick a lot. But BIG LoVE - a year-long survey of a Utah community - is one of the first to use modern diagnostics to track how often kids and other family members, both sick and well, have nasal infections of respiratory virus. Future studies will determine if reported trends hold true in larger and diverse populations.

A Positive Test May Not Mean Positively Sick

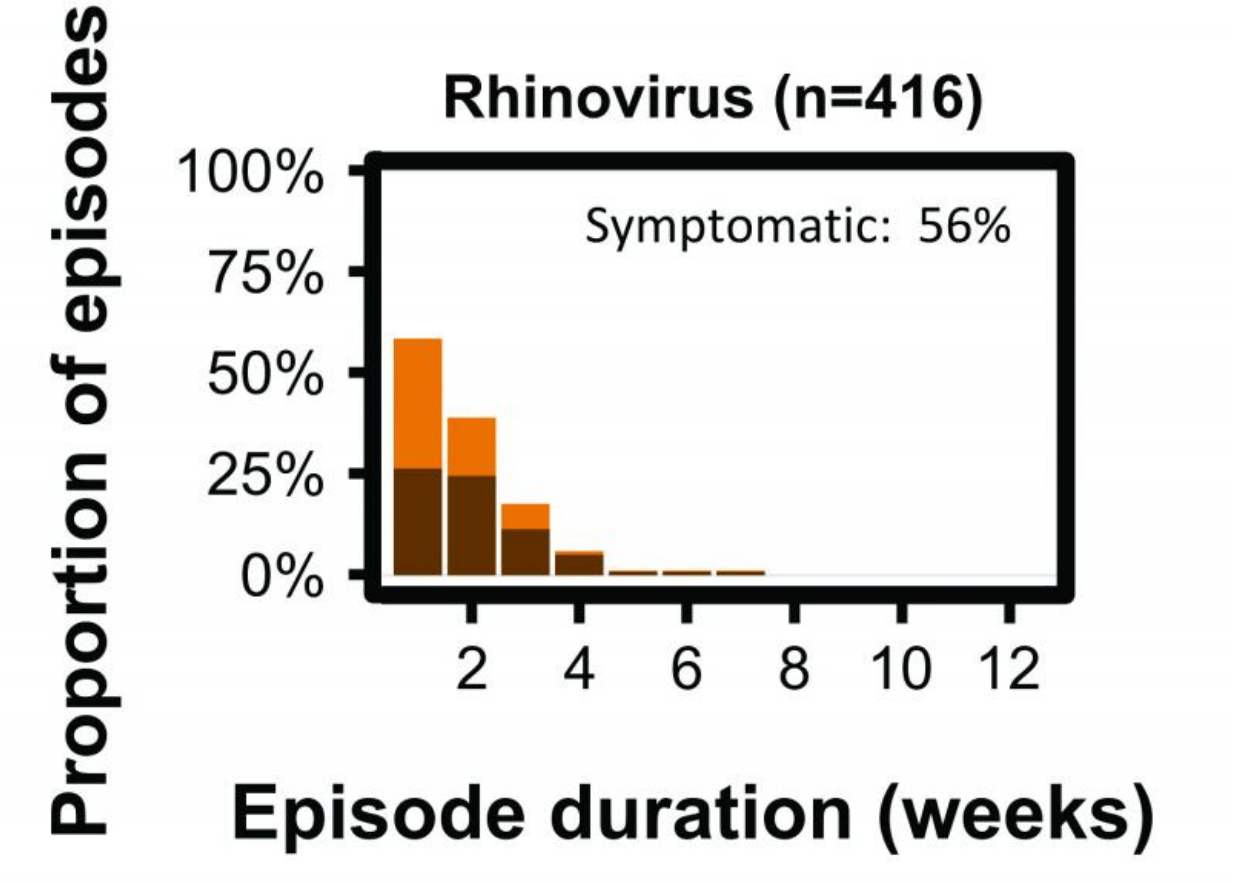
Perhaps the most surprising finding was how often participants carried virus, and showed no signs of being sick.

PCR-based diagnostics, like those used to test participants' samples in this study, are becoming increasingly common in clinical settings because they are much more sensitive and accurate than older tests, and provide results within hours, not days. Yet these findings suggest that

some test results should be interpreted with caution.

While study participants infected with influenza and parainfluenza viruses were sick most of the time, those who carried rhinovirus - the cause of the common cold - were only sick half of the time.

What's more, results suggest that even after a patient recovers from an illness, some viruses persist for weeks afterward. Bocavirus persisted in the nose for as long as 12 weeks, but more commonly viruses persisted for two weeks or less. In an accompanying commentary also published in *Clinical Infectious Diseases*, Gregory A. Storch, M.D., of Washington University School of Medicine in St. Louis, noted that the research "provides highly useful information," especially concerning how long PCR-based tests remained positive during each viral episode.



PCR-based diagnostics are becoming increasingly common in clinics, but the BIG-LoVE (Utah Better Identification of Germs-Longitudinal Viral Epidemiology) study by investigators at the University of Utah School of Medicine shows that on average, half of patients who tested positive for respiratory virus did not show any symptoms. The study tested 16 kinds of respiratory virus in all. Among study participants that tested positive for rhinovirus, the virus was found to persist for up to 7 weeks, but participants only showed symptoms (ie. coughing, fever) 56 percent of the time. Darker shading indicates symptomatic viral detection and lighter shading indicates asymptomatic viral detection. Credit: Carrie Byington, University of Utah School of Medicine

If presence of virus doesn't always translate into illness, then it stands to

reason that even if someone is sick and tests positive for a specific virus, there could be another cause. For example bacteria, or a rare virus not detected by the test. Health care providers should be aware of these limitations.

"If a child comes into the emergency room with severe respiratory illness and tests positive for rhinovirus, it might be a smart idea for doctors to make sure they're not missing something else that could be the cause," says co-first author and professor of pediatrics Krow Ampofo, M.B., Ch.B.

How Sickness Was Studied

BIG LoVE was a project to investigate how viruses are transmitted in families. Monitoring a community in Utah, the state with the largest number of children per household, allowed investigators to track differences among big and small families.

Investigators monitored 26 households collectively made up of 108 individuals (three were born during the course of the study) for one year. Each household collected nasal swabs from family members once per week and documented when they had symptoms typical of cold and flu. A PCR-based test, the FilmArray by BioFire Diagnostics, probed swabs for 16 different respiratory viruses, including influenza, rhinovirus, and respiratory syncytial virus (RSV). 4166 samples were analyzed in all. Future studies will examine trends in larger communities, and those in other geographical regions, and of different ethnicities.

More information: "Community Surveillance of Respiratory Viruses among Families in the Utah Better Identification of Germs-Longitudinal Viral Epidemiology (BIG-LoVE) Study" was published online in *Clinical Infectious Diseases* online on August 5, 2015.

Provided by University of Utah Health Sciences