# CRITICAL LINK

John M. Colmers
Secretary

*A Publication of the Maryland Department of Health and Mental Hygiene*

**The Laboratories Administration—Maryland's State Public Health Laboratory**


# Climate Change and Foodborne and Waterborne Infections

## *E. coli* O157:H7, the Chesapeake Bay, and beyond

If you search "climate change" via the Internet, there are over 80 million hits. The message is clear: global warming as a result of human activities will have a profound impact on our lives. Climate change does not imply only increased average global temperature. Other effects of climate change include trends towards stronger storm systems, increased frequency of heavy precipitation events and extended dry periods, and rising sea-levels. Here, we will emphasize the perspective of climate change and public health, focusing on foodborne and waterborne infections, specifically Entero-hemorhagic *Escherichia coli* (EHEC) O157:H7 and the Chesapeake Bay.

## Climate Change: the Fact Sheet

The Earth's climate is determined by incoming energy from the Sun and by the properties of the Earth and its atmosphere, namely the reflection, absorption, and emission of energy within the atmosphere and at the surface (See Figure 1.) Changes have occurred in several aspects of the atmosphere and surface that alter the global energy budget of the Earth, causing the climate to change. Among these are increases in greenhouse gas concentrations that act primarily to increase the atmospheric absorption of outgoing radiation, and increases in aerosols (microscopic air-borne particles or droplets) that act to reflect and absorb incoming solar radiation and change cloud radiative properties. Such changes cause global warming.

Greenhouse gases such as carbon dioxide ($CO_2$), nitrous oxide, and methane have increased sharply due to the consumption of fossil fuels, new

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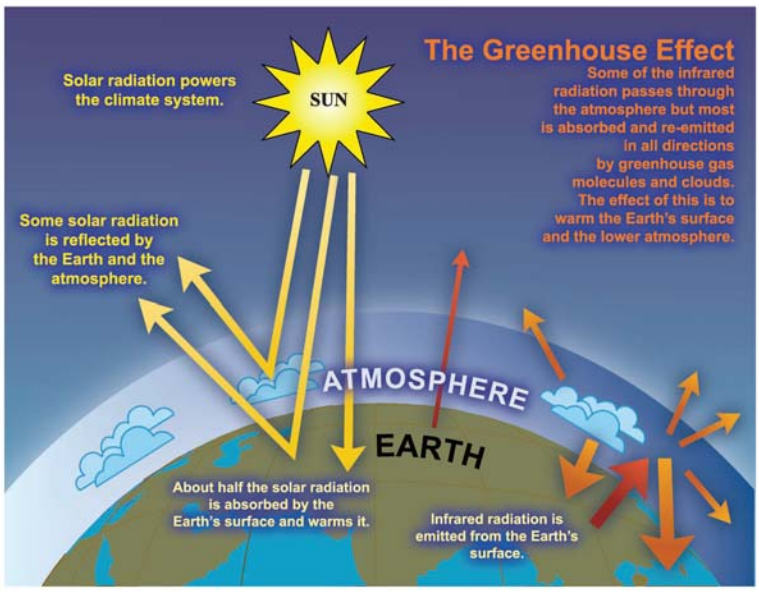


**Figure 1. Reflection, absorption, and emission of energy from the sun. Source: http://www.climatechangeconnection.org/Science/Greenhouseeffect.htm**

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forms of land use, and agricultural practices. Looking, for example, at $CO_2$ concentration, it has continued to increase and is now almost 100 ppm above its pre-industrial level (see Figure 2). The Annual $CO_2$ increase in emissions was significantly higher for the period from 2000 to 2005 than it was in the 1990s.[1] The greenhouse gas accumulation in the atmosphere has led to a rise of average temperatures for the last 150 years (see Figure 3). Warming of the climate system is also evident from observations of widespread melting of snow and ice, and the rising global average sea level.[1]

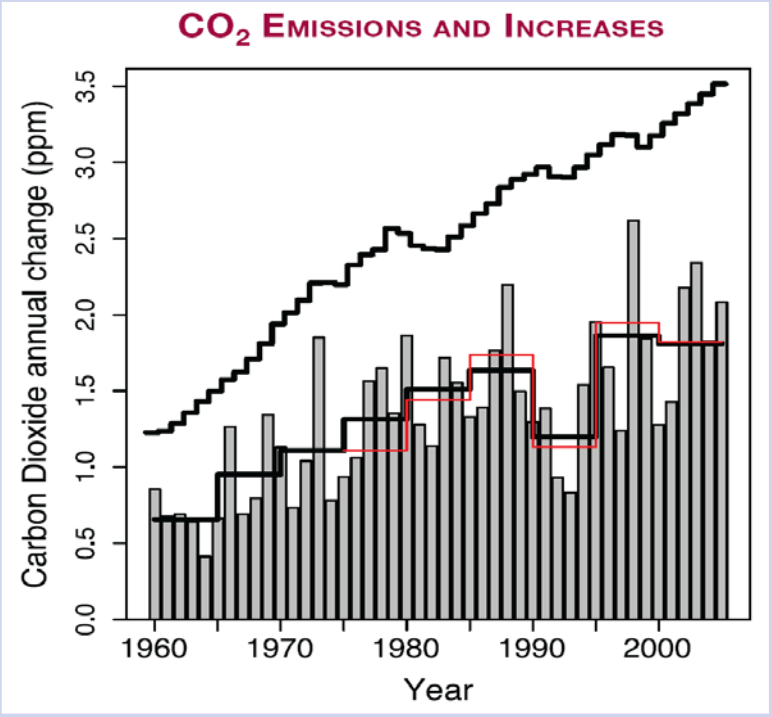


**Figure 2. $CO_2$ emissions. Source: IPCC; "A report accepted by Working Group I of the Intergovernmental Panel on Climate Change but not approved in detail."**

Projections for the 21st century show that global warming will accelerate, with predictions of the average increase in global temperature ranging from 1.8° C to 4°C.[1] However, the global temperature might increase more than 7°C by the end of this century. That's an astronomically large number, because an ice age is only about six degrees cooler than the interglacial cycle we're now in. And we're talking about a 10% chance it's as large a temperature difference as an ice age to an interglacial cycle, but happening in a century, not in five thousand years.

## Climate Change and Foodborne/Waterborne Outbreaks – An Example of EHEC O157:H7

Climate change may have both a direct and an indirect impact on the occurrence of foodborne or waterborne infections. Here we will discuss changes in the pattern of seasons, the newly emerging pathogens, and the wide-spread contamination due to runoffs, with a focus on *E. coli* O157:H7.

The change of seasons on foodborne/ waterborne pathogens is a direct effect of global warming. Survival and persistence of disease-causing organisms in the environment are directly influenced by temperature. Figure 4 shows an association of *Salmonella* and *Campylobacter* cases with temperature changes in Australia.[2] Higher environmental temperatures may increase *Salmonella* replication and enhance transmission. Higher temperatures also promote replication of *Salmonella* in food. Hospital admissions for *Salmonella* infection show a similar seasonal pattern to notifications. The *Campylobacter* peak in spring is more likely to be related to an intermediary

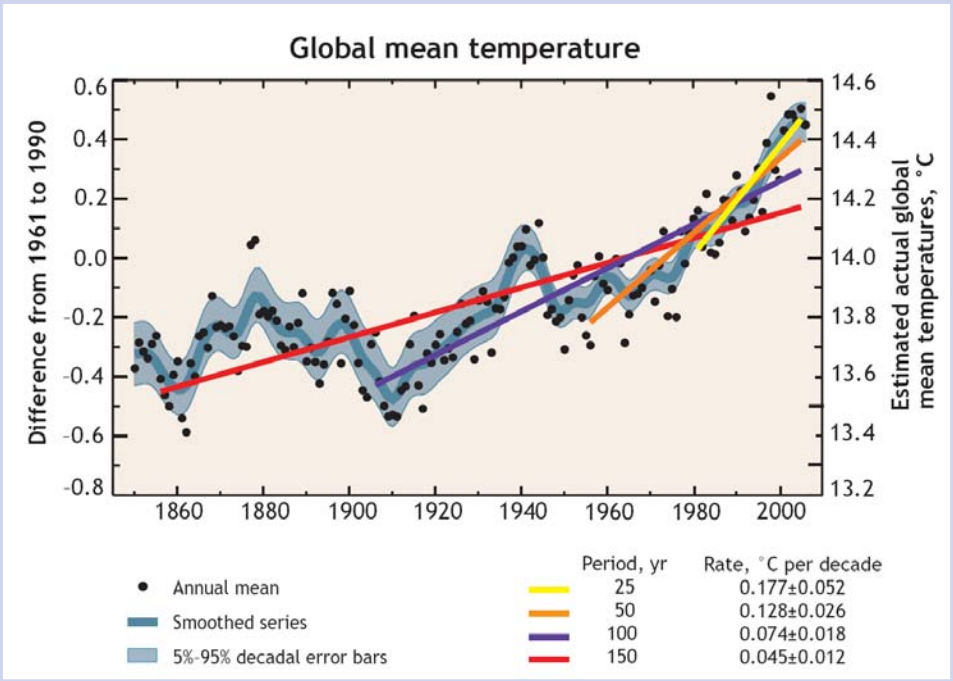


**Figure 3. Trends in mean global temperatures since the mid-19th century. Colored lines represent the linear trends over various time periods. Shorter (more recent time periods) lines have steeper slopes, indicating an accelerating warming trend for the planet. From Greer, 2008. Source: CMAJ 2008;178(6):715-22 "Climate change and infectious diseases in North America: the road ahead." http://www.cmaj.ca/cgi/reprint/178/6/715**

event triggered by temperature. *Campylobacter* spp. require specific conditions to replicate (including a temperature of 30°C.) In fact, major foodborne or waterborne bacterial pathogens[3] such as *Salmonella*, *Campylobacter*, *E. coli* (O157:H7), and *Vibrio*, are widely spread in nature and in animal hosts. The increase in temperature favors the persistence of these organisms and is of great concern due to global climate changes.[4] Infections with *Salmonella spp*. rise by 5 to 10% for each one-degree increase in the weekly temperature, or at ambient temperatures above 5 °C.

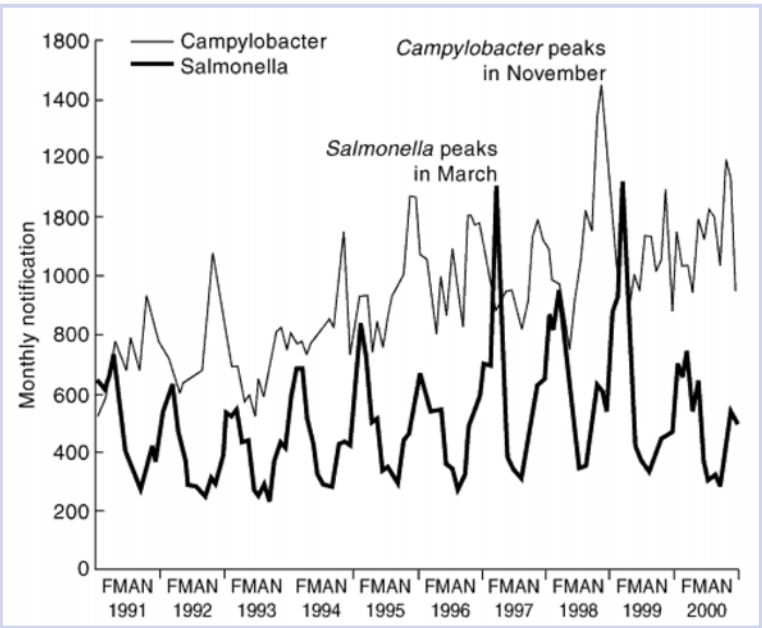


**Figure 4. Total monthly notifications of *Salmonella* and Campylobacter infections in Australia, 1991–2000. Source: G.V. Hall, D'Souza R.M., and Kirk, M.D., MJA 2002 177 (11/12): 614-618.**

Outbreaks of disease, associated with contaminated drinking water, occur when a number of events happen simultaneously. There must be transport of the contaminant to the water intake or well of the drinking water system, contamination of the source water, insufficient treatment to reduce the level of contamination, and exposure to the contaminant. The increased seasonal rainfall due to global warming also is an important factor which may have an obvious impact on the increase of intensity and frequencies of foodborne and waterborne outbreaks.[5, 6] Heavy rainfalls have been implicated in outbreaks (980 cases in 1980) of giardiasis in Montana, *E. coli* O157: H7 in 1999 in New York, and a waterborne cholera epidemic associated with El Niño (250,000 cases in 1991) in Peru. The significant link between excess rainfall and *E. coli* O157:H7 and *Campylobacter* outbreaks was reported in Walkerton, Canada in 2003.[7, 8] These outbreaks occurred several days after a heavy rainfall in May, and five-day accumulations could, on average, be expected only once every 60 years or more in the area.

In 2006, a widespread outbreak affecting 204 persons in 26 states was linked to contaminated spinach.[9] In this outbreak, 52% of the cases were hospitalized, 16% had hemolytic uremic syndrome (HUS), and one person died. Comprehensive studies concluded that the warmer temperatures and extreme rainfall are contributing factors to waterborne disease outbreaks in Canada and in the United States.[4, 7, 10]

The impact of climate change on the risk of foodborne or waterborne outbreaks has also been seen by the expanding ranges of species known to carry zoonotic diseases, changing pathogen dynamics in environmental reservoirs and altering pathogen transmission cycles. *E. coli* O157:H7 is a good example. Previous work indicates that *E. coli* O157:H7 evolved from enteropathogenic *E. coli* serotype O55:H7 (a cause of nonbloody diarrhea) in a stepwise manner through the sequential acquisition of Shiga-toxin

*(Continued on page 4)*

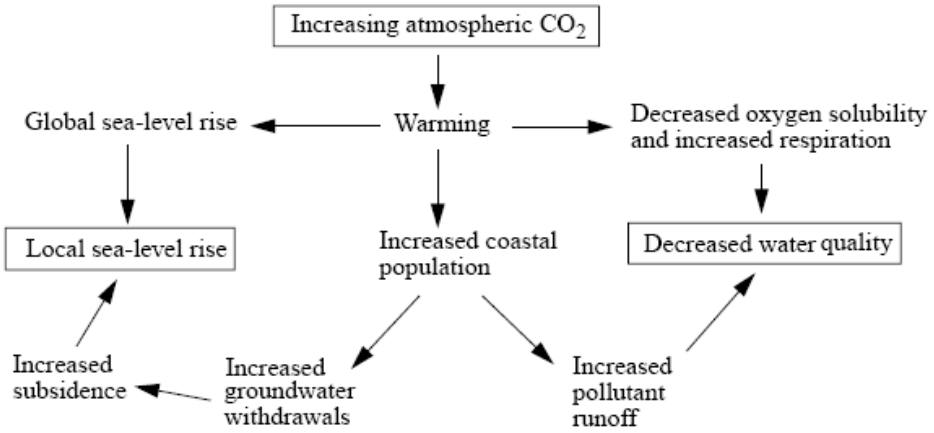


**Figure 5. Schematic showing possible synergistic impacts of climate change and coastal development on sea-level rise and water quality. Source: RG Najjar, et al., "The potential impacts of climate change on the mid-Atlantic coastal region", Clim. Res. 14: 219-233, 2000**

*(Continued from page 3)*

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(Stx) phage (encoding Stx2), a large virulence plasmid, an *rfb* locus converting the somatic O antigen from O55 to O157, and additional chromosomal mutations.[11] Comparative genomic studies of several *E. coli* O157:H7 strains have revealed extensive genomic diversity of bacteriophages and variability in the content of putative virulence genes. These developments have led Wick *et al.*[11] to conclude that "O157:H7 genomes are rapidly diverging and radiating into new niches as the pathogen disseminates."

Recently reported higher-than-typical rates of hospitalization and HUS implies that the implicated strain of *E. coli* O157:H7 had greater virulence potential than "typical" strains of the serotype.[11,12] Based on this hypothesis, Manning *et al.* investigated genomic diversity of *E. coli* O157:H7 strains.[14] Using comparative genomic sequencing microarrays, they investigated single nucleotide polymorphisms (SNPs) in 96 loci of more than 500 strains, dating back to the strains isolated from the first human EHEC outbreak in 1982. They identified 39 SNP genotypes that differ at 20% of SNP loci and separated them into 9 clades (groups). These clades differ in the frequency and distribution of Shiga toxin genes, and in the type of clinical disease. One specific clade, 8, was found to be associated in the 2006 spinach outbreak strain and in another 2006 isolate from a lettuce-borne outbreak involving 71 cases. Characterization of isolates from all 444 patients infected with *E. coli* O157 in Michigan since 2001 showed that the frequency of clade 8 strains has increased from 10% in 2002 to 46% in 2006. Manning *et al.* concluded that an emergent subpopulation of the clade 8 lineage acquired critical factors that contribute to more severe disease. It is interesting to note that Stx transduction events did not occur at low pH and low temperatures.[15] However, association of climate change with the evolution of EHEC O157 is not clear.

## Climate Change and Foodborne/Waterborne Outbreaks – an Example of the Chesapeake Bay

The Chesapeake Bay is the largest estuary in the United States. It is an incredibly complex ecosystem that includes important habitats and food webs. The Bay and its rivers, wetlands, and forests provide homes, food, and protection for complex groups of animals and plants in parts of six states: Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia. The Chesapeake Bay watershed covers 64,000 square miles and is home to about 17 million people. The population is expected to increase to more than 18 million residents by 2020.

The impact of climate change on the ecological system has been under active surveillance. Sea level in the Chesapeake Bay area probably will rise another 8 inches by 2025, 13 inches by 2050, and 27 inches by 2100, compared with the level in 1990.[16] Such a rate of sea level rise would be approximately double that of the preceding century. There is even a small risk, a 5% chance based on current models of glacial and oceanic processes, that the sea will rise as much as 44 inches by 2100. Sea level rise will submerge and erode the Bay's islands. Sand beaches and marshes along bay shores are vanishing in those developed areas where people armor the shoreline against the sea.

Storms, as a consequence of global warming, will do more damage as the sea level rises. Extreme events such as hurricanes, coastal storms, floods, and droughts affect coastal ecosystems and the people living along the coasts. Storms can cause major geographic changes and lead to more pollution in coastal ecosystems. The frequency, severity, and extent of Harmful Algal Blooms (HABs) can increase. Air pollution and excess nitrogen runoff resulting from agricultural operations continue to stress fragile marine ecosystems. Furthermore, climate change will cause Chesapeake Bay water to become warmer or more saline.

Recreation-related waterborne diseases can be the direct and severe consequence of increased rainfall due to global warming. Contamination of recreational waters can result from numerous sources, including urban and nonurban runoff, industrial pollution, storm waters, human and animal wastes, and indigenous sources such as red tides. The presence of microbial contaminants in fresh and marine waters has been associated with eye, ear, nose, skin, respiratory, gastrointestinal (including gastroenteritis and hepatitis), and other infections. During 1996, nearly 3,700 beach closings and advisories were issued at U.S. ocean, bay, and Great Lakes beaches. The detection of excessive concentrations of bacteria caused 83% of the closings.[17]

Contaminated and polluted waters could encourage the spread of oyster disease and affect fish in the Chesapeake Bay. Shellfish-associated outbreaks of gastroenteritis have involved a variety of bacterial pathogens including *Salmonella typhi*, *Campylobacter spp*, *Vibrio spp*., *V. cholerae*, *V. vulnificus*, and *V. parahaemolyticus.* A recent study conducted at the Center of Marine Biotechnology, University of Maryland Biotechnology Institute, demonstrated that *V. cholerae* was more frequently detected during the warmer months and in the northern Chesapeake Bay, where the salinity is lower.[18] Under scenarios of global climate change, increased climate variability, accompanied by higher stream flow rates and warmer temperatures, could favor conditions that increase the occurrence of *V. cholerae. V. cholerae* is both the causative agent of cholera and a natural inhabitant of the aquatic environment. Another continuing threat comes from contamination of the marine and freshwater environment caused by human waste disposal through raw waste or septic tanks, storm water, and inadequately disinfected sewage effluents.[19]

An increase in temperature or nutrients in the water allows harmful algae to flourish. This sudden increase in algae is called an "algae bloom." Algae blooms have severe consequences because the algae use up all the available nutrients and oxygen in the water, making it un-inhabitable for other organisms. In addition, HABs produce toxigenic illness, such as diarrheic shellfish poisoning, paralytic shellfish poisoning, neurotoxic shellfish poisoning, amnesic shellfish poisoning, and ciguatera fish poisoning. For example, the algae known as Pseudo-nitzschia can generate dangerously high levels of domoic acid, a neurotoxin. As other animals, like sardines or anchovies, eat this phytoplankton, the toxin can be transferred up the food chain. Large toxic blooms of Pseudo-nitzschia have closed beaches and disrupted the shellfish industry in the western United States and have been implicated in toxic blooms throughout the coastal waters of Europe, Asia and North America.[4]

During recent years, there has been an apparent increase in HAB in many marine and coastal regions.

## Climate Change & the Public Health - Concluding Remarks

As global warming is now a fact of life, we would do well to understand its effects on a spectrum of human diseases ranging from bacterial to viral, parasitological, and biotoxic diseases. How can the public health community prepare for the risks of foodborne/ waterborne infections? We must have the ability to measure changes in disease burden. There is also a need to develop the most appropriate policies, strategies, and measures to reduce the potential risks of infectious diseases as a result of global climate change.[6, 20]

The Laboratories Administration is involved in the surveillance and examination of foodborne and waterborne pathogens. This includes implementing advanced technologies to identify food/waterborne pathogens and providing first-hand information in assisting disease control and prevention for all Marylanders.

*This article was written by Dr. Chengru Zhu.*

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# Laboratory Statistics

Reported from the Laboratories Administration during the month of

## January 2009

### ENTERIC BACTERIOLOGY

| SEX | AGE | # | JURISDICTION |
|---|---|---|---|
| GENUS SEROVAR | | | |
| CAMPYLOBACTER JEJUNI | | | |
| U | 0 | 1 | ALLEGANY |
| F | 24 | 1 | ALLEGANY |
| M | 0 | 1 | ALLEGANY |
| F | 29 | 1 | ANNE ARUNDEL |
| F | 15 | 1 | ANNE ARUNDEL |
| M | 20 | 1 | ANNE ARUNDEL |
| F | 0 | 1 | BALTIMORE |
| F | 73 | 1 | BALTIMORE |
| F | 46 | 1 | BALTIMORE |
| M | 78 | 1 | BALTIMORE |
| M | 69 | 1 | BALTIMORE |
| M | 70 | 1 | TALBOT |
| ESCHERICHIA COLI, SEROTYPE O103 | | | |
| F | 2 | 1 | BALTIMORE CITY |
| ESCHERICHIA COLI, SEROTYPE O126 | | | |
| U | 0 | 1 | BALTIMORE |
| ESCHERICHIA COLI, SEROTYPE O157:H7 | | | |
| M | 72 | 1 | BALTIMORE CITY |
| M | 15 | 1 | BALTIMORE CITY |
| U | 9 | 1 | PRINCE GEORGE'S |
| ESCHERICHIA COLI, SEROTYPE O45:H2 | | | |
| M | 72 | 1 | MONTGOMERY |
| HAFNIA ALVEI | | | |
| U | 1 | 1 | OUT OF STATE |
| SALMONELLA | | | |
| M | 20 | 1 | ANNE ARUNDEL |
| F | 0 | 2 | BALTIMORE |
| F | 27 | 1 | BALTIMORE |
| U | 12 | 1 | BALTIMORE CITY |
| F | 0 | 2 | BALTIMORE CITY |
| F | 12 | 1 | BALTIMORE CITY |
| F | 1 | 1 | BALTIMORE CITY |
| U | 0 | 1 | CARROLL |
| M | 0 | 1 | CECIL |
| U | 12 | 1 | HARFORD |
| M | 0 | 1 | HARFORD |
| M | 80 | 1 | MONTGOMERY |
| F | 31 | 1 | OUT OF STATE |
| M | 1 | 1 | TALBOT |
| SALMONELLA BARDO | | | |
| F | 0 | 1 | BALTIMORE |
| SALMONELLA BERTA | | | |
| F | 85 | 1 | HARFORD |
| SALMONELLA BUDAPEST | | | |
| M | 51 | 1 | BALTIMORE |
| SALMONELLA ENTERITIDIS | | | |
| F | 0 | 1 | ALLEGANY |
| U | 11 | 1 | BALTIMORE |
| F | 60 | 2 | BALTIMORE |
| F | 44 | 1 | BALTIMORE |
| M | 82 | 2 | BALTIMORE |
| M | 47 | 1 | BALTIMORE |
| M | 38 | 1 | BALTIMORE |
| M | 2 | 2 | BALTIMORE |
| U | 1 | 1 | BALTIMORE CITY |
| U | 1 | 1 | BALTIMORE CITY |
| F | 0 | 1 | BALTIMORE CITY |
| F | 60 | 1 | BALTIMORE CITY |
| F | 45 | 1 | BALTIMORE CITY |
| F | 29 | 1 | BALTIMORE CITY |
| M | 73 | 1 | BALTIMORE CITY |
| M | 17 | 1 | BALTIMORE CITY |
| M | 8 | 1 | BALTIMORE CITY |
| M | 1 | 1 | BALTIMORE CITY |
| U | 0 | 1 | OUT OF STATE |
| M | 52 | 1 | OUT OF STATE |
| M | 24 | 1 | OUT OF STATE |
| F | 0 | 1 | PRINCE GEORGE'S |
| M | 73 | 1 | UNKNOWN |
| M | 50 | 1 | UNKNOWN |
| SALMONELLA MISSISSIPPI | | | |
| M | 0 | 1 | BALTIMORE |
| F | 37 | 4 | BALTIMORE |
| M | 60 | 1 | BALTIMORE |
| SALMONELLA NEWPORT | | | |
| F | 64 | 1 | OUT OF STATE |
| M | 39 | 1 | OUT OF STATE |
| M | 41 | 1 | OUT OF STATE |
| SALMONELLA SER TYPHI | | | |
| F | 24 | 3 | BALTIMORE CITY |
| SALMONELLA SER TYPHIMURIUM | | | |
| M | 0 | 2 | ALLEGANY |
| M | 16 | 1 | ANNE ARUNDEL |
| M | 16 | 1 | ANNE ARUNDEL |
| M | 16 | 1 | BALTIMORE |
| U | 1 | 1 | BALTIMORE |
| U | 42 | 1 | FREDERICK |
| F | 0 | 1 | MONTGOMERY |
| F | 32 | 1 | OUT OF STATE |
| M | 24 | 1 | OUT OF STATE |
| M | 8 | 1 | OUT OF STATE |
| SALMONELLA TYPHIMURIUM VAR COPENHAGEN | | | |
| F | 0 | 1 | BALTIMORE CITY |
| M | 48 | 1 | OUT OF STATE |
| M | 34 | 1 | OUT OF STATE |
| U | 45 | 1 | OUT OF STATE |
| SHIGELLA FLEXNERI | | | |
| M | 26 | 1 | BALTIMORE CITY |
| SHIGELLA FLEXNERI II:3,4 | | | |
| M | 53 | 1 | MONTGOMERY |
| SHIGELLA SONNEI | | | |
| F | 4 | 1 | ANNE ARUNDEL |
| F | 27 | 1 | BALTIMORE |
| F | 3 | 1 | BALTIMORE |
| U | 0 | 1 | BALTIMORE CITY |
| F | 0 | 2 | BALTIMORE CITY |
| F | 2 | 1 | BALTIMORE CITY |
| M | 59 | 1 | MONTGOMERY |
| F | 3 | 2 | OUT OF STATE |
| F | 0 | 1 | OUT OF STATE |
| M | 46 | 1 | OUT OF STATE |
| M | 0 | 1 | PRINCE GEORGE'S |
| YERSINIA ENTEROCOLITICA | | | |
| M | 0 | 1 | BALTIMORE CITY |
| **TOTAL** | | **108** | |

### ISOLATES - REFERENCE

| SOURCE | # | JURISDICTION |
|---|---|---|
| GENUS SPECIES | | |
| BREVIBACTERIUM CASEI | | |
| BLOOD | 1 | BALTIMORE CITY |
| CORYNEBACTERIUM GROUP G-1 | | |
| BLOOD | 1 | BALTIMORE CITY |
| CORYNEBACTERIUM SPECIES | | |
| WOUND | 1 | FREDERICK |
| WOUND | 1 | PRINCE GEORGE'S |
| ENTEROCOCCUS FAECALIS | | |
| BLOOD | 1 | BALTIMORE CITY |
| ENTEROCOCCUS FAECIUM | | |
| BLOOD | 1 | BALTIMORE CITY |
| HAEMOPHILUS SEGNIS | | |
| BLOOD | 1 | BALTIMORE CITY |
| KLEBSIELLA PNEUMONIAE SS OZAENAE | | |
| BLOOD | 1 | BALTIMORE CITY |
| STAPHYLOCOCCUS AUREUS | | |
| WOUND | 1 | BALTIMORE |
| BLOOD | 2 | BALTIMORE CITY |
| SKIN | 1 | BALTIMORE CITY |
| WOUND | 2 | BALTIMORE CITY |
| ABDOMINAL | 1 | CARROLL |
| NASO | 1 | CARROLL |
| WOUND | 2 | CARROLL |
| OTHER | 1 | CECIL |
| FOOT | 1 | FREDERICK |
| TOE WOUND | 1 | FREDERICK |
| WOUND | 3 | FREDERICK |
| MRSA WND | 1 | PRINCE GEORGE'S |
| WOUND | 1 | SOMERSET |
| STAPHYLOCOCCUS COAGULASE NEGATIVE | | |
| WOUND | 1 | ALLEGANY |
| BLOOD | 1 | BALTIMORE CITY |
| CSF | 1 | BALTIMORE CITY |
| SKIN | 1 | BALTIMORE CITY |
| WOUND | 1 | CARROLL |
| STREPTOCOCCUS BETA HEMOLYTIC GROUP B | | |
| VAGINAL | 2 | ANNE ARUNDEL |
| VAGINAL | 1 | PRINCE GEORGE'S |
| VAGINAL | 5 | PRINCE GEORGE'S |
| STREPTOCOCCUS MITIS | | |
| BLOOD | 2 | BALTIMORE CITY |
| **TOTAL** | **49** | |

## ISOLATES - MISCELLANEOUS

| GENUS SPECIES / SOURCE | # | JURISDICTION |
|---|---|---|
| ACINETOBACTER CALCOACETICUS | | |
| OTHER | 1 | FREDERICK |
| ACINETOBACTER CALCOACETICUS-ACINETOBACTER BAUMANNI COMPLEX | | |
| CSF | 1 | BALTIMORE CITY |
| CORYNEBACTERIUM SPECIES | | |
| WOUND | 1 | FREDERICK |
| DIPHTHEROIDS | | |
| WOUND | 1 | PRINCE GEORGE'S |
| ENTEROBACTER CLOACAE | | |
| WOUND | 1 | FREDERICK |
| ESCHERICHIA COLI | | |
| WOUND | 2 | FREDERICK |
| GARDNERELLA VAGINALIS | | |
| VAGINAL | 4 | SOMERSET |
| VAGINAL | 1 | SOMERSET |
| KLEBSIELLA PNEUMONIAE | | |
| BLOOD | 1 | BALTIMORE CITY |
| PROTEUS MIRABILIS | | |
| WOUND | 1 | BALTIMORE CITY |
| STAPHYLOCOCCUS AUREUS | | |
| BLOOD | 2 | BALTIMORE CITY |
| BUTTOCK | 1 | BALTIMORE CITY |
| OTHER | 1 | BALTIMORE CITY |
| SKIN | 2 | BALTIMORE CITY |
| SKIN-MRSA | 1 | BALTIMORE CITY |
| WOUND | 2 | BALTIMORE CITY |
| WOUND | 1 | CARROLL |
| WOUND | 2 | FREDERICK |
| LIP | 1 | MONTGOMERY |
| VAGINAL | 1 | PRINCE GEORGE'S |
| STAPHYLOCOCCUS COAGULASE NEGATIVE | | |
| BLOOD | 1 | BALTIMORE CITY |
| OTHER | 1 | FREDERICK |
| WOUND | 1 | PRINCE GEORGE'S |
| STREPTOCOCCUS BETA HEMOLYTIC GROUP A | | |
| THROAT | 2 | WICOMICO |
| STREPTOCOCCUS BETA HEMOLYTIC NON-GROUP A | | |
| THROAT | 6 | WICOMICO |
| STREPTOCOCCUS BETA HEMOLYTIC GROUP B | | |
| VAGINAL | 2 | ANNE ARUNDEL |
| CSF | 1 | BALTIMORE CITY |
| VAGINAL | 1 | CHARLES |
| VAGINAL | 8 | HOWARD |
| VAGINAL | 2 | PRINCE GEORGE'S |
| VAGINAL | 13 | PRINCE GEORGE'S |
| VAGINAL | 1 | SOMERSET |
| STREPTOCOCCUS MITIS | | |
| BLOOD | 1 | BALTIMORE CITY |
| STREPTOCOCCUS SALIVARIUS SS SALIVARIUS | | |
| CSF | 1 | BALTIMORE CITY |
| STREPTOCOCCUS SALIVARUS | | |
| BLOOD | 1 | BALTIMORE CITY |
| STREPTOCOCCUS SANGUINIS | | |
| SKIN | 1 | MONTGOMERY |
| **TOTAL** | **71** | |

The services and facilities of the Maryland Department of Health and Mental Hygiene (DHMH) are operated on a non-discriminatory basis. This policy prohibits discrimination on the basis of age; ancestry; color; creed; marital status; mental or physical disability; national origin; race; religious affiliation, belief, or opinion; sex; or sexual orientation and plies to the provisions of employment and granting of advantages, privileges and accommodations. The Department, in compliance with the Americans with Disabilities Act, ensures that qualified individuals with disabilities are given an opportunity to participate in and benefit from DHMH services, programs, benefits, and employment opportunities.

## SEXUALLY TRANSMITTED DISEASES

| GENUS SPECIES / SEX | # | JURISDICTION |
|---|---|---|
| SYPHILIS SEROLOGY | | |
| F | 1 | ALLEGANY |
| F | 5 | ANNE ARUNDEL |
| M | 5 | ANNE ARUNDEL |
| F | 3 | BALTIMORE |
| M | 5 | BALTIMORE |
| F | 16 | BALTIMORE CITY |
| M | 31 | BALTIMORE CITY |
| U | 1 | BALTIMORE CITY |
| M | 1 | CALVERT |
| M | 2 | CHARLES |
| U | 1 | CHARLES |
| F | 1 | DORCHESTER |
| F | 3 | MONTGOMERY |
| M | 7 | MONTGOMERY |
| F | 6 | PRINCE GEORGE'S |
| M | 24 | PRINCE GEORGE'S |
| F | 1 | SOMERSET |
| F | 1 | UNKNOWN |
| F | 1 | WASHINGTON |
| M | 1 | WASHINGTON |
| F | 2 | WICOMICO |
| M | 3 | WICOMICO |
| **TOTAL** | **121** | |

| CHLAMYDIA TRACHOMATIS | | |
|---|---|---|
| F | 3 | ALLEGANY |
| M | 2 | ALLEGANY |
| F | 7 | ANNE ARUNDEL |
| M | 11 | ANNE ARUNDEL |
| M | 7 | BALTIMORE |
| F | 5 | BALTIMORE CITY |
| M | 61 | BALTIMORE CITY |
| U | 2 | BALTIMORE CITY |
| F | 2 | GARRETT |
| M | 17 | HARFORD |
| F | 2 | HOWARD |
| M | 1 | HOWARD |
| M | 2 | KENT |
| F | 9 | MONTGOMERY |
| M | 22 | MONTGOMERY |
| U | 1 | MONTGOMERY |
| F | 4 | PRINCE GEORGE'S |
| M | 41 | PRINCE GEORGE'S |
| U | 2 | PRINCE GEORGE'S |
| M | 2 | SOMERSET |
| F | 2 | WASHINGTON |
| F | 2 | WICOMICO |
| M | 3 | WICOMICO |
| **TOTAL** | **210** | |

| NEISSERIA GONORRHOEAE | | |
|---|---|---|
| F | 2 | ALLEGANY |
| F | 1 | BALTIMORE |
| M | 4 | BALTIMORE |
| F | 2 | CHARLES |
| M | 3 | CHARLES |
| M | 2 | DORCHESTER |
| M | 2 | FREDERICK |
| F | 1 | HARFORD |
| F | 1 | MONTGOMERY |
| F | 9 | PRINCE GEORGE'S |
| M | 19 | PRINCE GEORGE'S |
| F | 2 | SAINT MARY'S |
| M | 1 | SAINT MARY'S |
| F | 1 | WASHINGTON CO |
| M | 1 | WASHINGTON CO |
| F | 2 | WICOMICO |
| M | 9 | WICOMICO |
| F | 5 | WORCESTER |
| M | 1 | WORCESTER |
| **TOTAL** | **68** | |

## PENICILLIN RESISTANT GONORRHEA

REPORTED QUARTERLY
NO REPORT THIS MONTH

## MYCOBACTERIOLOGY

| ISOLATE / SEX | AGE | # | JURISDICTION |
|---|---|---|---|
| AEROBIC ACTINOMYCETE | | | |
| F | 65 | 1 | BALTIMORE CITY |
| MYCOBACTERIUM ABSCESSUS | | | |
| F | 66 | 1 | BALTIMORE |
| M | 87 | 1 | CALVERT |
| F | 74 | 1 | MONTGOMERY |

| | | | |
|---|---|---|---|
| MYCOBACTERIUM AVIUM COMPLEX | | | |
| F | 63 | 1 | BALTIMORE |
| F | 77 | 1 | BALTIMORE |
| F | 89 | 1 | BALTIMORE |
| M | 65 | 2 | BALTIMORE |
| M | 72 | 3 | BALTIMORE |
| F | 33 | 1 | BALTIMORE CITY |
| F | 36 | 1 | BALTIMORE CITY |
| F | 38 | 1 | BALTIMORE CITY |
| F | 73 | 1 | BALTIMORE CITY |
| F | 79 | 2 | BALTIMORE CITY |
| M | 49 | 1 | BALTIMORE CITY |
| M | 50 | 1 | BALTIMORE CITY |
| M | 58 | 1 | BALTIMORE CITY |
| M | 69 | 1 | BALTIMORE CITY |
| F | 49 | 1 | FREDERICK |
| F | 72 | 1 | MONTGOMERY |
| M | 36 | 1 | MONTGOMERY |
| F | 24 | 1 | OUT OF STATE |
| F | 87 | 2 | PRINCE GEORGE'S |
| M | 27 | 1 | PRINCE GEORGE'S |
| F | 20 | 1 | TALBOT |
| F | 85 | 1 | TALBOT |
| M | 74 | 2 | TALBOT |
| M | 36 | 3 | WICOMICO |
| M | 76 | 1 | WICOMICO |
| MYCOBACTERIUM CHELONAE | | | |
| F | 63 | 2 | BALTIMORE |
| F | 63 | 1 | BALTIMORE CITY |
| MYCOBACTERIUM FORTUITUM | | | |
| F | 41 | 1 | ANNE ARUNDEL |
| M | 28 | 1 | BALTIMORE CITY |
| M | 51 | 1 | BALTIMORE CITY |
| M | 73 | 1 | HOWARD |
| F | 58 | 2 | MONTGOMERY |
| F | 72 | 4 | MONTGOMERY |
| F | 77 | 1 | MONTGOMERY |
| M | 36 | 1 | MONTGOMERY |
| M | 45 | 1 | MONTGOMERY |
| M | 49 | 1 | MONTGOMERY |
| M | 55 | 1 | MONTGOMERY |
| MYCOBACTERIUM FORTUITUM COMPLEX | | | |
| F | 63 | 1 | BALTIMORE |
| MYCOBACTERIUM GORDONAE | | | |
| M | 61 | 1 | BALTIMORE CITY |
| M | 76 | 1 | BALTIMORE CITY |
| M | 74 | 1 | FREDERICK |
| F | 25 | 3 | MONTGOMERY |
| F | 62 | 1 | MONTGOMERY |
| F | 82 | 1 | MONTGOMERY |
| M | 46 | 1 | MONTGOMERY |
| M | 67 | 2 | MONTGOMERY |
| M | 50 | 2 | PRINCE GEORGE'S |
| M | 51 | 1 | TALBOT |
| U | 0 | 1 | WICOMICO |
| MYCOBACTERIUM KANSASII | | | |
| F | 71 | 1 | CALVERT |
| M | 43 | 1 | MONTGOMERY |
| M | 68 | 1 | WASHINGTON |
| MYCOBACTERIUM MARINUM | | | |
| M | 19 | 1 | ANNE ARUNDEL |
| M | 57 | 1 | ANNE ARUNDEL |
| MYCOBACTERIUM TUBERCULOSIS | | | |
| F | 81 | 1 | ANNE ARUNDEL |
| F | 70 | 1 | BALTIMORE |
| M | 25 | 1 | BALTIMORE |
| F | 38 | 1 | FREDERICK |
| F | 32 | 1 | MONTGOMERY |
| M | 20 | 1 | MONTGOMERY |
| F | 24 | 1 | OUT OF STATE |
| M | 54 | 1 | OUT OF STATE |
| F | 22 | 1 | PRINCE GEORGE'S |
| M | 35 | 1 | PRINCE GEORGE'S |
| MYCOBACTERIUM TUBERCULOSIS COMPLEX | | | |
| M | 51 | 3 | BALTIMORE |
| M | 54 | 5 | BALTIMORE |
| F | 51 | 2 | BALTIMORE CITY |
| M | 59 | 1 | BALTIMORE CITY |
| M | 78 | 1 | HARFORD |
| F | 19 | 1 | MONTGOMERY |
| F | 40 | 1 | MONTGOMERY |
| F | 65 | 1 | MONTGOMERY |
| M | 46 | 1 | MONTGOMERY |
| M | 68 | 1 | MONTGOMERY |
| F | 32 | 1 | OUT OF STATE |
| F | 58 | 1 | OUT OF STATE |
| F | 75 | 1 | OUT OF STATE |
| M | 24 | 1 | OUT OF STATE |
| M | 39 | 1 | OUT OF STATE |
| M | 44 | 1 | OUT OF STATE |
| M | 85 | 1 | OUT OF STATE |
| F | 22 | 2 | PRINCE GEORGE'S |
| F | 35 | 3 | PRINCE GEORGE'S |
| M | 35 | 2 | PRINCE GEORGE'S |
| M | 36 | 2 | PRINCE GEORGE'S |
| M | 50 | 1 | PRINCE GEORGE'S |
| M | 36 | 2 | WICOMICO |
| NON-PHOTOCHROMOGENIC MYCOBACTERIA | | | |
| M | 76 | 1 | BALTIMORE CITY |
| **TOTAL** | | **123** | |

## MYCOBACTERIUM SUSCEPTIBILITY RESULTS

23 ISOLATES IDENTIFIED

**7 DRUG RESISTANT STRAINS FOUND**

| # | JURISDICTION | DRUG(S) |
|---|---|---|
| 1 | MONTGOMERY | ISONIAZID |
| 2[A] | MONTGOMERY | ISONIAZID, PYRAZINAMIDE, ETHAMBUTOL |
| 1 | WICOMICO | ISONIAZID, STREPTOMYCIN, ETHAMBUTOL |
| 1 | PRINCE GEORGE'S | STREPTOMYCIN |
| 1 | BALTIMORE CITY | ISONIAZID |
| 1 | WASHINGTON DC | RIFAMPIN, RIFABUTIN |

[A] TWO ISOLATES FROM THE SAME PATIENT
[B] PROBABLE FOR M. BOVIS
[C] MEETS CASE DEFINITION OF MULTI-DRUG TUBERCULOSIS (MDRTB)

*Mycobacterium tuberculosis* complex consists of:
*M. tuberculosis*
*M. bovis*
*M. bovis, BCG*
*M. africanum*
*M. microti*
*M. canettii*

## MYCOLOGY

| ISOLATE SEX | AGE | # | JURISDICTION |
|---|---|---|---|
| ABSIDIA CORYMBIFERA | | | |
| M | 71 | 1 | BALTIMORE CITY |
| ALTERNARIA SPECIES | | | |
| F | 39 | 1 | ALLEGANY |
| M | 15 | 2 | MONTGOMERY |
| ASPERGILLUS FUMIGATUS | | | |
| F | 60 | 1 | BALTIMORE CITY |
| F | 20 | 1 | MONTGOMERY |
| F | 71 | 2 | PRINCE GEORGE'S |
| M | 59 | 1 | TALBOT |
| ASPERGILLUS OCHRACEUS | | | |
| | 49 | 1 | BALTIMORE |
| ASPERGILLUS SPECIES | | | |
| F | 88 | 1 | WICOMICO |
| ASPERGILLUS VERSICOLOR | | | |
| F | 65 | 1 | ANNE ARUNDEL |
| | 49 | 1 | BALTIMORE |
| M | 84 | 1 | CALVERT |
| F | 68 | 1 | MONTGOMERY |
| CANDIDA ALBICANS | | | |
| F | 46 | 1 | BALTIMORE CITY |
| M | 57 | 1 | BALTIMORE CITY |
| M | 60 | 1 | BALTIMORE CITY |
| F | 80 | 1 | CALVERT |
| F | 90 | 1 | CALVERT |
| M | 63 | 1 | CALVERT |
| F | 58 | 1 | MONTGOMERY |
| F | 59 | 5 | MONTGOMERY |
| F | 64 | 1 | MONTGOMERY |
| F | 65 | 1 | MONTGOMERY |
| F | 68 | 2 | MONTGOMERY |
| F | 78 | 1 | MONTGOMERY |
| F | 80 | 1 | MONTGOMERY |
| M | 39 | 1 | MONTGOMERY |
| M | 49 | 2 | MONTGOMERY |
| M | 52 | 1 | MONTGOMERY |
| M | 55 | 1 | MONTGOMERY |
| M | 58 | 1 | MONTGOMERY |
| M | 59 | 1 | MONTGOMERY |
| M | 78 | 1 | MONTGOMERY |
| M | 94 | 1 | MONTGOMERY |
| F | 18 | 2 | PRINCE GEORGE'S |
| F | 20 | 1 | PRINCE GEORGE'S |
| F | 40 | 1 | PRINCE GEORGE'S |
| F | 47 | 1 | PRINCE GEORGE'S |
| F | 50 | 1 | PRINCE GEORGE'S |
| F | 52 | 1 | PRINCE GEORGE'S |
| F | 65 | 1 | PRINCE GEORGE'S |
| F | 67 | 1 | PRINCE GEORGE'S |
| M | 27 | 1 | PRINCE GEORGE'S |
| M | 30 | 1 | PRINCE GEORGE'S |
| M | 45 | 1 | PRINCE GEORGE'S |
| M | 46 | 1 | PRINCE GEORGE'S |
| M | 74 | 1 | PRINCE GEORGE'S |
| M | 76 | 1 | PRINCE GEORGE'S |
| M | 85 | 1 | PRINCE GEORGE'S |
| CANDIDA GLABRATA | | | |
| F | 46 | 1 | BALTIMORE CITY |
| F | 65 | 1 | MONTGOMERY |
| F | 67 | 1 | MONTGOMERY |
| F | 66 | 1 | PRINCE GEORGE'S |
| F | 71 | 1 | PRINCE GEORGE'S |
| CANDIDA KRUSEI | | | |
| M | 62 | 1 | CALVERT |

| | | | |
|---|---|---|---|
| CANDIDA LUSITANIAE | | | |
| F | 36 | 1 | PRINCE GEORGE'S |
| CANDIDA PARAPSILOSIS | | | |
| M | 96 | 1 | BALTIMORE |
| M | 0 | 1 | BALTIMORE CITY |
| F | 53 | 1 | FREDERICK |
| F | 67 | 1 | MONTGOMERY |
| F | 21 | 1 | PRINCE GEORGE'S |
| F | 46 | 1 | PRINCE GEORGE'S |
| F | 56 | 1 | PRINCE GEORGE'S |
| CANDIDA TROPICALIS | | | |
| F | 71 | 1 | PRINCE GEORGE'S |
| F | 72 | 1 | PRINCE GEORGE'S |
| CHRYSOSPORIUM SPECIES | | | |
| F | 32 | 1 | BALTIMORE CITY |
| CLADOSPORIUM SPECIES | | | |
| M | 48 | 1 | ANNE ARUNDEL |
| F | 53 | 1 | MONTGOMERY |
| CRYPTOCOCCUS NEOFORMANS | | | |
| M | 80 | 1 | MONTGOMERY |
| M | 41 | 1 | PRINCE GEORGE'S |
| EXOPHIALA SPECIES | | | |
| F | 51 | 1 | BALTIMORE CITY |
| FUSARIUM SPECIES | | | |
| F | 12 | 1 | BALTIMORE CITY |
| GEOTRICHUM SPECIES | | | |
| M | 56 | 1 | CALVERT |
| HISTOPLASMA CAPSULATUM | | | |
| F | 52 | 1 | BALTIMORE CITY |
| M | 26 | 1 | MONTGOMERY |
| MICROSPORUM CANIS | | | |
| M | 4 | 2 | TALBOT |
| M | 6 | 2 | TALBOT |
| MOULD | | | |
| U | 57 | 1 | CARROLL |
| MUCOR SPECIES | | | |
| M | 75 | 1 | ANNE ARUNDEL |
| MYCELIA STERILIA | | | |
| F | 65 | 1 | ANNE ARUNDEL |
| F | 65 | 1 | BALTIMORE CITY |
| NOCARDIA ASTEROIDES | | | |
| M | 49 | 1 | BALTIMORE CITY |
| NOCARDIA NOVA | | | |
| M | 49 | 1 | BALTIMORE CITY |
| M | 68 | 1 | WICOMICO |
| NOCARDIA SPECIES | | | |
| M | 79 | 1 | ALLEGANY |
| PENICILLIUM SPECIES | | | |
| F | 0 | 1 | ANNE ARUNDEL |
| F | 84 | 1 | ANNE ARUNDEL |
| F | 68 | 1 | MONTGOMERY |
| M | 42 | 1 | MONTGOMERY |
| F | 78 | 1 | TALBOT |
| M | 92 | 1 | TALBOT |
| STREPTOMYCES SPECIES | | | |
| M | 63 | 1 | BALTIMORE CITY |
| TRICHOPHYTON MENTAGROPHYTES | | | |
| | 81 | 1 | ANNE ARUNDEL |
| TRICHOPHYTON RUBRUM | | | |
| M | 59 | 1 | BALTIMORE CITY |
| TRICHOPHYTON SPECIES | | | |
| M | 54 | 1 | BALTIMORE CITY |
| TRICHOPHYTON TONSURANS | | | |
| | 44 | 1 | BALTIMORE CITY |
| F | 11 | 1 | TALBOT |
| M | 11 | 1 | TALBOT |
| TSUKAMURELLA SPECIES | | | |
| F | 45 | 1 | OUT OF STATE |
| **TOTAL** | **110** | | |

## PARASITOLOGY

| GENUS/SPECIES | # | JURISDICTION |
|---|---|---|
| ASCARIS LUMBRICOIDES | | |
| | 2 | HOWARD |
| BLASTOCYSTIS HOMINIS | | |
| | 4 | PRINCE GEORGE'S |
| | 1 | MONTGOMERY |
| | 1 | FREDERICK |
| | 2 | BALTIMORE CITY |
| | 1 | MONTGOMERY |
| | 2 | BALTIMORE CITY |
| | 1 | ANNE ARUNDEL |
| | 1 | BALTIMORE CITY |
| | 1 | FREDERICK |
| | 3 | MONTGOMERY |
| | 1 | PRINCE GEORGE'S |
| | 3 | ANNE ARUNDEL |
| | 1 | FREDERICK |
| | 7 | FREDERICK |
| DIENTAMOEBA FRAGILIS | | |
| | 1 | BALTIMORE CITY |
| | 1 | MONTGOMERY |
| | 1 | PRINCE GEORGE'S |
| ENDOLIMAX NANA | | |
| | 3 | HOWARD |
| | 3 | BALTIMORE CITY |
| | 1 | FREDERICK |
| | 1 | PRINCE GEORGE'S |
| | 3 | MONTGOMERY |
| | 1 | FREDERICK |
| | 2 | MONTGOMERY |
| | 1 | HOWARD |
| ENTAMOEBA COLI | | |
| | 2 | PRINCE GEORGE'S |
| | 1 | FREDERICK |
| | 1 | MONTGOMERY |
| | 1 | PRINCE GEORGE'S |
| | 2 | HOWARD |
| | 5 | MONTGOMERY |
| | 1 | ANNE ARUNDEL |
| ENTAMOEBA HARTMANNI | | |
| | 2 | BALTIMORE CITY |
| ENTEROBIUS VERMICULARIS | | |
| | 1 | MONTGOMERY |
| | 1 | BALTIMORE |
| | 1 | FREDERICK |
| GIARDIA LAMBLIA | | |
| | 2 | HOWARD |
| HOOKWORM | | |
| | 4 | MONTGOMERY |
| IODAMOEBA BÜTSCHLII | | |
| | 1 | ANNE ARUNDEL |
| PLASMODIUM FALCIPARUM | | |
| | 1 | ANNE ARUNDEL |
| **TOTAL** | **75** | |

## WATER MICROBIOLOGY

| | # TESTED | # NON-COMPLIANT |
|---|---|---|
| COMMUNITY | 2 | 0 |
| NON-COMMUNITY | 380 | 55 |
| **TOTAL** | **382** | **55** |

## FOOD SAFETY & SECURITY

| | TOTALS |
|---|---|
| FOOD | |
| SAMPLES | 44 |
| NOTABLE PATHOGENS: | |
| SALMONELLA SP. | 1 |
| CAMPYLOBACTER SP. | 4 |
| CRABMEAT | |
| SAMPLES | 0 |
| EXCEEDING STANDARDS[1] | 0 |
| NOTABLE PATHOGENS: | 0 |
| SHELLFISH | |
| SAMPLES | 0 |
| EXCEEDING STANDARDS[2] | 0 |
| NOTABLE PATHOGENS: | 0 |
| SHELLFISH GROWING WATERS | |
| SAMPLES | 181 |
| **TOTAL SAMPLES** | 225 |
| **TOTAL STANDARDS EXCEEDED** | 0 |

STANDARDS

[1]CRABMEAT FRESH
*ESCHERICHIA COLI* AT < 36 MPN/100 GRAMS
STANDARD PLATE COUNT AT < 100

[2]SHELLFISH
FECAL COLIFORMS AT < 230 MPN/100 GRAMS
STANDARD PLATE COUNT AT < 500,000 PER GRAM

## VIRUS ISOLATION

| ISOLATE | SEX | AGE | # | JURISDICTION |
|---|---|---|---|---|
| ADENOVIRUS | | | | |
| | F | 0 | 1 | BALTIMORE CITY |
| | F | 0 | 1 | BALTIMORE CITY |
| **SUBTOTAL** | | **2** | | |
| HERPES SIMPLEX VIRUS TYPE 1 | | | | |
| | M | 17 | 1 | TALBOT |
| | M | 0 | 1 | BALTIMORE CITY |
| | M | 2 | 1 | BALTIMORE CITY |
| **SUBTOTAL** | | **3** | | |
| HERPES SIMPLEX VIRUS TYPE 2 | | | | |
| | F | 24 | 1 | ALLEGANY |
| | F | 22 | 1 | PRINCE GEORGE'S |
| **SUBTOTAL** | | **2** | | |
| INFLUENZA A VIRUS | | | | |
| | M | 5 | 1 | BALTIMORE CITY |
| | F | 0 | 1 | BALTIMORE CITY |
| **SUBTOTAL** | | **2** | | |
| **TOTAL** | | **9** | | |

## VIRAL POLYMERASE CHAIN REACTION (PCR)

| ISOLATE SEX | AGE | # | JURISDICTION |
|---|---|---|---|
| HERPES SIMPLEX VIRUS TYPE 1 | | | |
| F | 25 | 1 | ALLEGANY |
| F | 19 | 1 | ANNE ARUNDEL |
| U | 20 | 1 | BALTIMORE CITY |
| F | 0 | 1 | BALTIMORE CITY |
| F | 18 | 1 | BALTIMORE CITY |
| F | 30 | 1 | BALTIMORE CITY |
| M | 21 | 1 | BALTIMORE CITY |
| U | 47 | 1 | CECIL |
| F | 18 | 1 | CHARLES |
| F | 20 | 1 | CHARLES |
| M | 21 | 1 | CHARLES |
| M | 16 | 1 | FREDERICK |
| F | 17 | 1 | PRINCE GEORGE'S |
| F | 19 | 1 | PRINCE GEORGE'S |
| F | 19 | 1 | WICOMICO |
| F | 20 | 1 | WICOMICO |
| F | 24 | 1 | WICOMICO |
| F | 18 | 1 | WORCESTER |
| HERPES SIMPLEX VIRUS TYPE 2 | | | |
| F | 24 | 2 | ALLEGANY |
| F | 22 | 1 | ANNE ARUNDEL |
| F | 25 | 1 | ANNE ARUNDEL |
| F | 28 | 1 | ANNE ARUNDEL |
| F | 42 | 1 | ANNE ARUNDEL |
| U | 27 | 1 | BALTIMORE |
| F | 23 | 1 | BALTIMORE |
| F | 47 | 1 | BALTIMORE |
| U | 25 | 1 | BALTIMORE CITY |
| U | 49 | 1 | BALTIMORE CITY |
| F | 15 | 1 | BALTIMORE CITY |
| F | 16 | 1 | BALTIMORE CITY |
| F | 19 | 2 | BALTIMORE CITY |
| F | 20 | 1 | BALTIMORE CITY |
| F | 21 | 3 | BALTIMORE CITY |
| F | 23 | 1 | BALTIMORE CITY |
| F | 24 | 1 | BALTIMORE CITY |
| F | 26 | 1 | BALTIMORE CITY |
| F | 40 | 1 | BALTIMORE CITY |
| F | 41 | 1 | BALTIMORE CITY |
| F | 53 | 1 | BALTIMORE CITY |
| F | 54 | 1 | BALTIMORE CITY |
| M | 19 | 1 | BALTIMORE CITY |
| M | 21 | 1 | BALTIMORE CITY |
| M | 22 | 1 | BALTIMORE CITY |
| M | 23 | 1 | BALTIMORE CITY |
| M | 24 | 1 | BALTIMORE CITY |
| M | 28 | 1 | BALTIMORE CITY |
| M | 29 | 1 | BALTIMORE CITY |
| M | 39 | 1 | BALTIMORE CITY |
| M | 40 | 1 | BALTIMORE CITY |
| M | 44 | 2 | BALTIMORE CITY |
| M | 48 | 1 | BALTIMORE CITY |
| M | 80 | 1 | BALTIMORE CITY |
| U | 26 | 1 | BALTIMORE CITY |
| F | 21 | 1 | CHARLES |
| F | 46 | 1 | FREDERICK |
| F | 47 | 1 | FREDERICK |
| F | 22 | 1 | HARFORD |
| M | 24 | 1 | HOWARD |
| M | 38 | 1 | MONTGOMERY |
| M | 46 | 1 | MONTGOMERY |
| F | 17 | 1 | PRINCE GEORGE'S |
| F | 19 | 1 | PRINCE GEORGE'S |
| F | 22 | 3 | PRINCE GEORGE'S |
| F | 28 | 1 | PRINCE GEORGE'S |
| F | 35 | 1 | PRINCE GEORGE'S |
| F | 46 | 1 | PRINCE GEORGE'S |
| M | 22 | 1 | PRINCE GEORGE'S |
| M | 23 | 1 | PRINCE GEORGE'S |
| M | 29 | 1 | PRINCE GEORGE'S |
| U | 23 | 1 | UNKNOWN |
| F | 17 | 1 | WICOMICO |
| INFLUENZA A VIRUS | | | |
| F | 1 | 1 | BALTIMORE CITY |
| M | 2 | 1 | BALTIMORE CITY |
| M | 45 | 1 | CALVERT |
| M | 20 | 1 | MONTGOMERY |
| INFLUENZA A (H1) VIRUS | | | |
| F | 13 | 1 | ALLEGANY |
| F | 1 | 1 | BALTIMORE |
| F | 27 | 1 | BALTIMORE |
| F | 13 | 1 | BALTIMORE CITY |
| F | 15 | 1 | BALTIMORE CITY |
| F | 3 | 1 | BALTIMORE CITY |
| M | 0 | 1 | BALTIMORE CITY |
| M | 1 | 1 | BALTIMORE CITY |
| M | 12 | 1 | BALTIMORE CITY |
| M | 20 | 1 | BALTIMORE CITY |
| M | 22 | 1 | BALTIMORE CITY |
| M | 4 | 1 | BALTIMORE CITY |
| M | 42 | 1 | BALTIMORE CITY |
| M | 48 | 1 | BALTIMORE CITY |
| F | 14 | 1 | CALVERT |
| M | 18 | 1 | CALVERT |
| F | 0 | 2 | MONTGOMERY |
| F | 51 | 1 | MONTGOMERY |
| M | 1 | 1 | MONTGOMERY |
| M | 16 | 1 | MONTGOMERY |
| M | 24 | 1 | MONTGOMERY |
| M | 4 | 1 | MONTGOMERY |
| M | 40 | 1 | MONTGOMERY |
| M | 5 | 1 | MONTGOMERY |
| F | 16 | 1 | WORCESTER |
| INFLUENZA A (H3) VIRUS | | | |
| F | 27 | 1 | BALTIMORE CITY |
| M | 40 | 1 | BALTIMORE CITY |
| INFLUENZA B VIRUS | | | |
| F | 15 | 1 | BALTIMORE CITY |
| F | 36 | 1 | BALTIMORE CITY |
| F | 6 | 1 | BALTIMORE CITY |
| M | 18 | 1 | BALTIMORE CITY |
| M | 2 | 1 | BALTIMORE CITY |
| M | 3 | 1 | BALTIMORE CITY |
| M | 37 | 1 | BALTIMORE CITY |
| F | 18 | 1 | CALVERT |
| F | 19 | 1 | CALVERT |
| F | 20 | 1 | CALVERT |
| M | 15 | 1 | MONTGOMERY |
| M | 16 | 1 | MONTGOMERY |
| M | 3 | 1 | MONTGOMERY |
| M | 4 | 1 | MONTGOMERY |
| M | 0 | 1 | PRINCE GEORGE'S |
| **TOTAL** | | **125** | |

## VIRAL HEPATITIS

| ORGANISM | # SPECIMENS | # POSITIVES | JURISDICTION |
|---|---|---|---|
| HEPATITIS B | | | |
| | 57 | 2 | ALLEGANY |
| | 186 | 1 | ANNE ARUNDEL |
| | 52 | 1 | BALTIMORE |
| | 507 | 3 | BALTIMORE CITY |
| | 3 | 0 | CALVERT |
| | 8 | 0 | CARROLL |
| | 183 | 0 | CECIL |
| | 1 | 0 | CHARLES |
| | 56 | 0 | FREDERICK |
| | 16 | 0 | GARRETT |
| | 34 | 2 | HARFORD |
| | 32 | 0 | HOWARD |
| | 213 | 4 | MONTGOMERY |
| | 5 | 1 | PRINCE GEORGE'S |
| | 351 | 14 | PRINCE GEORGE'S |
| | 7 | 0 | QUEEN ANNE'S |
| | 1 | 0 | SAINT MARY'S |
| | 6 | 0 | SOMERSET |
| | 9 | 0 | TALBOT |
| | 28 | 0 | WASHINGTON |
| | 105 | 0 | WICOMICO |
| | 1 | 0 | WORCESTER |
| **SUBTOTAL** | **1,861** | **28** | |
| HEPATITIS C | | | |
| | 54 | 9 | ALLEGANY |
| | 212 | 53 | ANNE ARUNDEL |
| | 51 | 5 | BALTIMORE |
| | 270 | 70 | BALTIMORE CITY |
| | 4 | 0 | CALVERT |
| | 12 | 0 | CARROLL |
| | 103 | 16 | CECIL |
| | 1 | 0 | CHARLES |
| | 71 | 4 | FREDERICK |
| | 17 | 0 | GARRETT |
| | 22 | 2 | HARFORD |
| | 1 | 0 | HOWARD |
| | 26 | 1 | MONTGOMERY |
| | 5 | 2 | PRINCE GEORGE'S |
| | 236 | 4 | PRINCE GEORGE'S |
| | 36 | 1 | QUEEN ANNE'S |
| | 2 | 0 | SAINT MARY'S |
| | 3 | 0 | SOMERSET |
| | 7 | 0 | TALBOT |
| | 5 | 0 | WASHINGTON |
| | 19 | 1 | WICOMICO |
| | 1 | 1 | WORCESTER |
| **SUBTOTAL** | **1,158** | **169** | |
| **TOTALS** | **3,019** | **197** | |

## RABIES

| SOURCE | # | JURISDICTION |
|---|---|---|
| CAT | 1 | MONTGOMERY |
| FOX | 1 | CAROLINE |
| RACCOON | 1 | BALTIMORE |
| | 1 | CARROLL |
| | 1 | DORCHESTER |
| | 1 | FREDERICK |
| | 1 | HARFORD |
| | 5 | MONTGOMERY |
| | 2 | PRINCE GEORGE'S |
| | 1 | ST MARYS |
| | 1 | SOMERSET |
| | 1 | TALBOT |
| | 1 | WASHINGTON |
| | 1 | WORCESTER |
| SKUNK | 1 | CECIL |
| | 1 | DORCHESTER |
| **TOTAL POSITIVES** | **21** | |
| **TOTAL SPECIMENS** | **255** | |

## CHLAMYDIOPHILIA PSITTACI
(CHLAMYDIA)

REPORTED QUARTERLY
NO REPORT THIS MONTH

## CD4 FLOW CYTOMETRY WORKLOAD

REPORTED QUARTERLY
NO REPORT THIS MONTH

## BLOOD LEAD

| MARYLAND | | | |
|---|---|---|---|
| | I | <10 | 108 |
| | IIA | 10-14 | 6 |
| | IIB | 15-19 | 6 |
| | III | 20-44 | 5 |
| | IV | 45-69 | 0 |
| | V | >69 | 0 |
| **TOTAL** | | | **125** |

| WASHINGTON DC | | | |
|---|---|---|---|
| | I | <10 | 0 |
| | IIA | 10-14 | 1 |
| | IIB | 15-19 | 0 |
| | III | 20-44 | 0 |
| | IV | 45-69 | 0 |
| | V | >69 | 0 |
| **TOTAL** | | | **1** |

## NEWBORN & CHILDHOOD SCREENING

STATISTICS FOR JANUARY 2009

| PRESUMPTIVE POSITIVES | |
|---|---|
| **DISORDERS** | **#** |
| PHENYLKETONURIA | 2 |
| MAPLE SYRUP URINE DISEASE | 4 |
| HOMOCYSTINURIA | 15 |
| TYROSINEMIA | 5 |
| ARGININEMIA | 0 |
| CITRULLINEMIA | 0 |
| GALACTOSEMIA | 6 |
| BIOTINIDASE DEFICIENCY | 0 |
| HYPOTHYROIDISM | 56 |
| HEMOGLOBIN -DISEASE | 13 |
| HEMOGLOBIN -BENIGN | 494 |
| CONGENITAL ADRENAL HYPERPLASIA (CAH) | 44 |
| CYSTIC FIBROSIS | 5 |
| FATTY ACID OXIDATIONS | 6 |
| ORGANIC ACIDEMIAS | 4 |
| ACYLCARNITINE - BORDERLINE | 0 |
| ACYLCARNITINE - OTHERS | 0 |

| MONTHLY TOTALS | |
|---|---|
| # OF SPECIMENS SCREENED | 10,924 |
| NUMBER OF TESTS | 886,704 |
| % UNSATISFACTORY SPECIMENS | 2.8 |

| YEAR-TO-DATE CONFIRMED CASES | |
|---|---|
| **CONDITIONS** | **# CONFIRMED** |
| MCAD | 0 |
| 3MCC | 0 |
| SCAD | 0 |
| VLCAD | 0 |
| GA-I | 0 |
| IVA | 0 |
| PA | 0 |
| MAPLE SYRUP URINE DISEASE | 0 |
| PKU- CLINICALLY SIGNIFICANT VARIANT | 0 |
| CLINICALLY SIGNIFICANT VARIANT HYPERPHENYLALANINEMIA (NOT CLASSICAL PKU) | 0 |
| VARIANT HYPERPHENYLALANINEMIA (NOT CLINICALLY SIGNIFICANT) | 0 |
| CITRULINEMIA I (CIT-I) | 0 |
| GALACTOSEMIA- CLASSICAL GALT DEFICIENCY | 0 |
| GALACTOSEMIA - VARIANT | 0 |
| BIOTINIDASE DEFICIENCY | 0 |
| GALACTOSE EPIMERASE DEFICIENCY | 0 |
| PARTIAL BIOTINIDASE DEFICIENCY | 0 |
| CAH- CLASSICAL SALT WASTING | 0 |
| CAH-NON-CLASSICAL | 0 |
| HYPOTHYROIDISM - PRIMARY | 0 |
| OTHER HYPOTHYROIDISM | 0 |
| SECONFARY HYPOTHYROIDISM | 0 |
| SICKLE CELL DISEASE -SS | 0 |
| SICKLE CELL DISEASE -SC | 0 |
| SICKLE CELL DISEASE -SE | 0 |
| SICKLE CELL DISEASE -S BETA THALASSEMIA | 0 |
| CYSTIC FIBROSIS | 0 |

## ENVIRONMENTAL CHEMISTRY

| SAMPLES | # NON-COMPLIANT | # TESTED |
|---|---|---|
| ASBESTOS | | |
| AIR | 0 | 0 |
| BULK | 0 | 1 |
| AIR QUALITY | | |
| $PM_{2.5}$ | 0 | 467 |
| $PM_{10}$ | 0 | 0 |
| RADIATION | | |
| AIR/CHARCOAL FILTERS | 0 | 64 |
| MILK | 0 | 0 |
| WIPES | 0 | 37 |
| RAW WATER | 0 | 5 |
| VEGETATION | 0 | 0 |
| OTHER | 0 | 0 |
| DRINKING WATER | | |
| METALS | | |
| COMMUNITY | 11 | 17 |
| NON-COMMUNITY | 3 | 9 |
| PRIVATE WELLS | 27 | 169 |
| PESTICIDES & PCBs | | |
| COMMUNITY | 0 | 56 |
| NON-COMMUNITY | 0 | 8 |
| PRIVATE WELLS | 0 | 0 |
| VOLATILE ORGANIC COMPOUNDS | | |
| COMMUNITY | 1 | 185 |
| NON-COMMUNITY | 0 | 63 |
| PRIVATE WELLS | 3 | 155 |
| RADIATION | | |
| COMMUNITY | 0 | 0 |
| NON-COMMUNITY | 8 | 42 |
| PRIVATE WELLS | 5 | 5 |
| INORGANICS | | |
| COMMUNITY | 0 | 15 |
| NON-COMMUNITY | 6 | 175 |
| PRIVATE WELLS | 7 | 206 |
| FOOD CHEMISTRY | | |
| SUSPECTED TAMPERING | 0 | 0 |
| MICROSCOPIC FILTH | 0 | 0 |
| LABELING | 0 | 0 |
| SURVEILLANCE | 0 | 0 |
| CHEMICAL CONTAMINATION | 0 | 0 |
| **TOTAL** | **71** | **1,679** |

## VIRAL LOAD SPECIMENS

| HIV-1 RNA COPIES/ML | $<10^3$ | $10^3$—$10^4$ | $10^4$—$10^5$ | $>10^5$ | TOTALS |
|---|---|---|---|---|---|
| ALLEGANY | 13 | 1 | 1 | 1 | 16 |
| CARROLL | 2 | 0 | 0 | 0 | 2 |
| FREDERICK | 3 | 1 | 0 | 0 | 4 |
| MONTGOMERY | 80 | 13 | 21 | 4 | 118 |
| PRINCE GEORGE'S | 80 | 9 | 14 | 6 | 109 |
| SOMERSET | 1 | 0 | 0 | 0 | 1 |
| WASHINGTON | 2 | 0 | 0 | 0 | 2 |
| WICOMICO | 2 | 2 | 1 | 0 | 5 |
| SUBTOTALS | 183 | 26 | 37 | 11 | 257 |
| DEPT. OF CORRECTIONS | 27 | 10 | 5 | 1 | 43 |
| **TOTALS** | **210** | **36** | **42** | **12** | **300** |

## HIV ANTIBODY SCREENING

| SUBMITTER | TOTAL SPECI-MENS | # EIA POSITIVE | % EIA POSITIVE | # WB POSITIVE | % WB POSITIVE |
|---|---|---|---|---|---|
| CORRECTIONAL INSTITUTIONS | 152 | 1 | 0.66 | 1 | 100.00% |
| FAMILY PLANNING (NON-GOVERNMENT) | 84 | 0 | 0 | 0 | 0.00% |
| HEALTH CENTERS (NON-GOVERNMENT) | 484 | 42 | 8.68 | 40 | 95.24% |
| HEALTH DEPT, NON-STD, FAMILY PLANNING | 432 | 3 | 0.69 | 3 | 100.00% |
| HEALTH DEPT, NON-STD, OB/GYN | 23 | 0 | 0 | 0 | 0.00% |
| HEALTH DEPT, NON-STD, OTHER | 632 | 41 | 6.49 | 40 | 97.56% |
| HEALTH DEPT, STD CLINICS | 575 | 13 | 2.26 | 12 | 92.31% |
| HOSPITAL, OTHER | 126 | 7 | 5.56 | 5 | 71.43% |
| HOSPITAL, PUBLIC | 9 | 0 | 0 | 0 | 0.00% |
| LABORATORIES (NON-HOSPITAL) | 347 | 5 | 1.44 | 4 | 80.00% |
| PEDIATRIC - CHILD HEALTH | 4 | 0 | 0 | 0 | 0.00% |
| PRIVATE PHYSICIANS | 10 | 2 | 20.00 | 1 | 50.00% |
| PRIVATE STUDENT HEALTH CENTERS | 32 | 0 | 0 | 0 | 0.00% |
| PUBLIC STUDENT HEALTH CENTERS | 132 | 0 | 0 | 0 | 0.00% |
| **TOTALS** | **3,042** | **114** | **3.75** | **106** | 92.98% |

MAILING LABEL

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Baltimore, Maryland 21201