GEORGIA VIRAL HEPATITIS EPIDEMIOLOGIC PROFILE

2017

Georgia Department of Public Health

Development of the Georgia Viral Hepatitis Epidemiologic Profile was grant funded through the Association of State and Territorial Health Officials (ASTHO), *Building State Health Department Capacity to Develop and Utilize Viral Hepatitis Epidemiologic Profiles*.

Acknowledgements

Authors:
Ami P. Gandhi, MPH
Amanda Dinwiddie, MPH
Tracy Kavanaugh, MPH, MCHES
Lynne Mercedes
Cherie Drenzek, DVM, MS

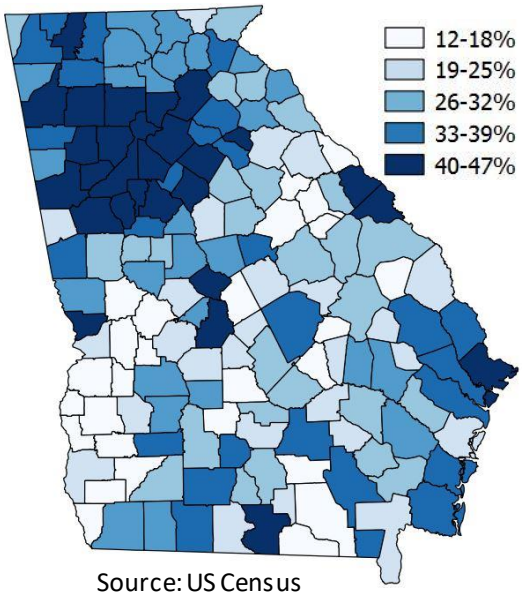
Contributors:
Elizabeth Burkhardt, MPH
Fabio Machado, MPH
Irene Solomon, MPH
Laura Edison, DVM, MPH
Rodriquez Lambert, MPH, PhD
Chrissy McNamara, MPH
Lesley Miller, MD
Shauni Williams
Merry Perry
Carolyn Eiland
Marie Sutton
Caitlin Gardner
Dr. Bonzo Reddick
Rachel See
Gregory Felzien, MD, AAHIVS
Brian Pearlman, MD

Table of Contents

Georgia Population Characteristics

Georgia, the largest state east of the Mississippi River, is a predominantly rural state, yet the majority of the state's population is concentrated in the counties surrounding the metropolitan Atlanta area. (Figure 1.1) Consequently, the majority of the state's health care resources, including viral hepatitis testing, care, and treatment resources, are located in the metro Atlanta area. This poses great challenges in reaching and providing services for those in other areas of the state who are at high risk for and chronically infected with HBV and HCV.

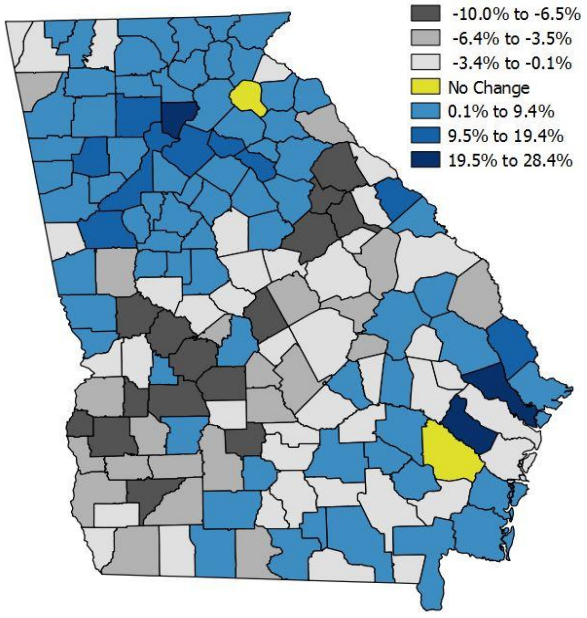
Figure 1.1: Population Size by County, Georgia, 2016



Source: US Census

The estimated population of Georgia in 2016 was 10,310,371, comprising 3.2% of the US population. The population of Georgia has continued to grow, with a 6.4% increase since 2010, compared to a 4.7% increase nationally.[1] Georgia's Office of Planning and Budget projected Georgia to experience the fastest-paced population growth (21%) from 2010-2020 in the southeastern United States, followed by North Carolina (18%), Florida (13%), South Carolina (10%), Tennessee (10%), and Alabama (8.5%).[2] The vast majority of population increases from 2010 to 2016 occurred in the metro Atlanta area, north Georgia, and parts of southeast Georgia. Many rural counties throughout the state have experienced decreases in population. (Figure 1.2)

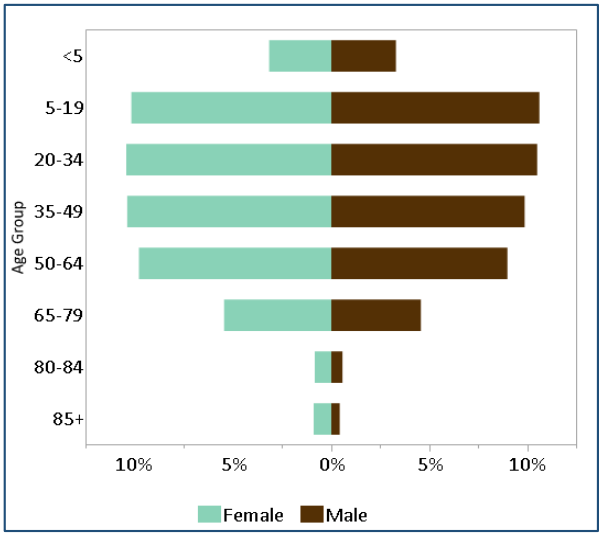
Figure 1.2: Percent Population Change by County, Georgia, 2010-2016



Source: US Census

The distribution of gender and age in Georgia is similar to the national population. Males and females were almost equally proportioned in 2015, with females making up 51% of the population in both Georgia and the US.[3] The majority of Georgia's adult population is between 20 and 64 years of age, with a fairly even distribution between males and females in the various age groups. Approximately 28% of Georgia's population is 19 years of age or younger. Those over the age of 65 years make up approximately 12% of Georgia's population, with slightly more females (7%) in that age group than males (5%). (Figure 1.3) Comparing the median age of Georgia's population at 34.3 years in 2005 to 35.9 years in 2015 shows that Georgia's population is aging overall.[4]

Figure 1.3: Age and Gender Distribution, Georgia, 2015



Source: US Census

In 2015, Georgia's population was nearly 62% White, 32% Black or African American, and 4% Asian, Native Hawaiian, or Pacific Islander.[5] (Figure 1.4) Approximately 9% of Georgia's population identified as Hispanic or Latino.[5] (Figure 1.5)

Figure 1.4: Georgia Population by Race, 2015

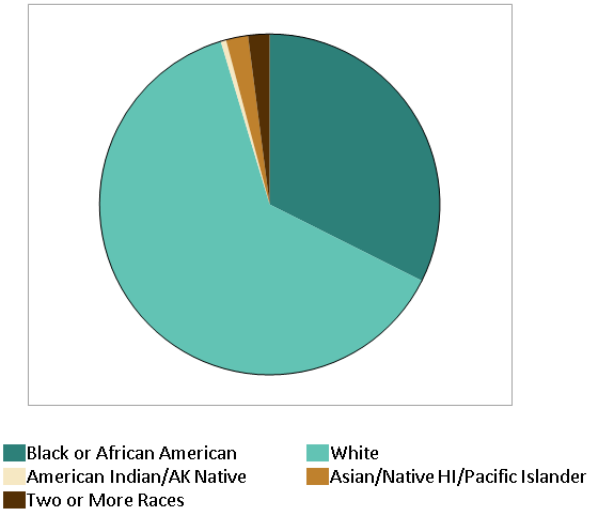
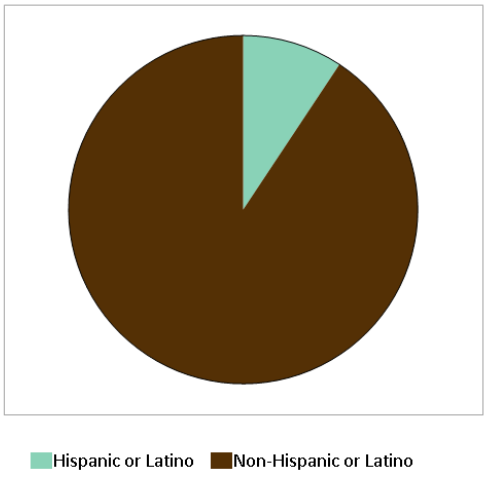


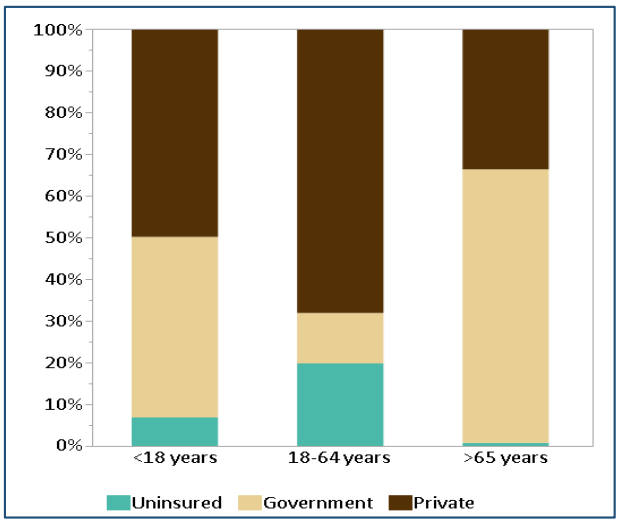
Figure 1.5: Georgia Population by Ethnicity, 2015



Source: US Census

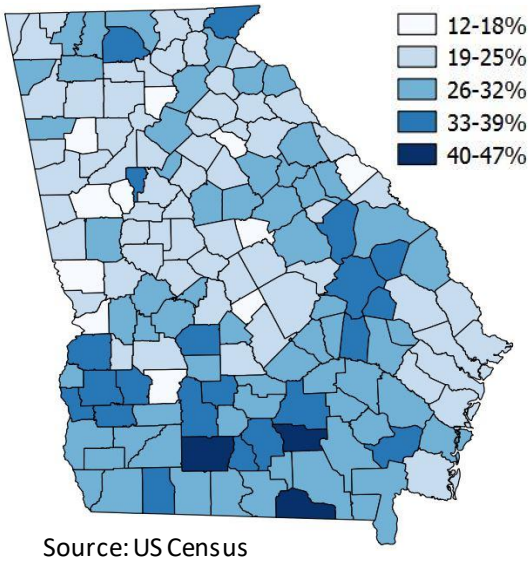
Between 2011 and 2015, the median household income for Georgians was $49,620, which was approximately 8% lower than the national median income of $53,889. Additionally, 18.4% of Georgia's residents had incomes below the poverty level in 2015, compared to 15.5% nationally.[3]

Figure 1.7: Health Insurance Coverage, by Age Group, Georgia, 2015



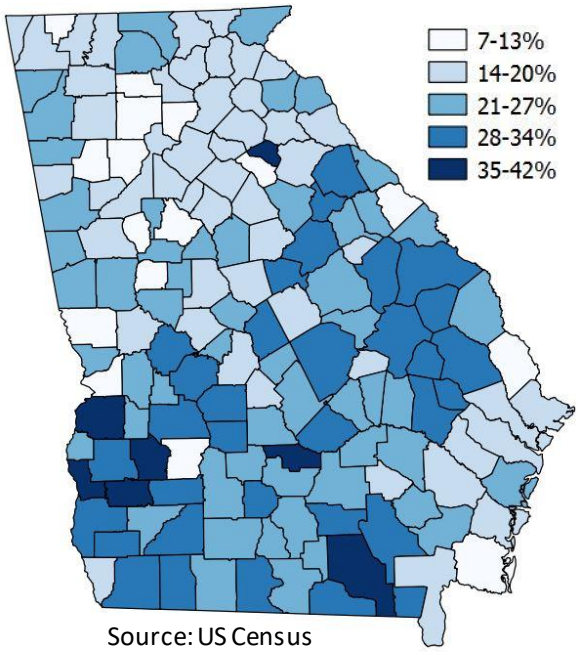
Source: US Census

Figure 1.8: Percent of Uninsured Adults <65 Years of Age by County, Georgia, 2011-2015



Source: US Census

Figure 1.6: Percent Living Below the Poverty Level, by County, Georgia, 2015



Source: US Census

In 2015, 11.1% of Georgia's population was uninsured, increasing to 12.9% in 2016.[6] Based on 2015 Census data, 20% of Georgians between the ages of 18 and 64 years were uninsured, 12% had government health insurance, and 68% had private health insurance. Of those under the age of 18 years, 7% were uninsured, 43% had government health insurance and 50% had private health insurance coverage. For those over the age of 65 years, 66% had government health insurance, while 34% had private coverage and 15% were uninsured. (Figure 1.7) The majority of the uninsured population less than 65 years of age were concentrated in the southern and eastern areas of Georgia as well as parts of north Georgia, which are largely rural areas of the state. (Figure 1.8)

References:

[1]Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010, to July 1, 2016 (NST-EST2016-01). U.S. Census Bureau, Population Division. December 2016.

[2]Georgia Population Projections 2010-2030. Office of Planning and Budget. March 12, 2010. http://www.georgialibraries.org/lib/construction/georgia_population_projections_march_2010.pdf

[3]U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates. DP05 – ACS Demographic and Housing Estimates.

[4]U.S. Census Bureau, 2005 American Community Survey. DP01 – General Demographic Characteristics: 2005.

[5]US Census Bureau. Georgia Quick Facts. https://www.census.gov/quickfacts/GA.

[6]National Center for Health Statistics, National Health Interview Survey Early Release Program. Health Insurance Coverage: Early Release of Estimates from the National Health Interview Survey, 2016. https://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201705.pdf.

Hepatitis A

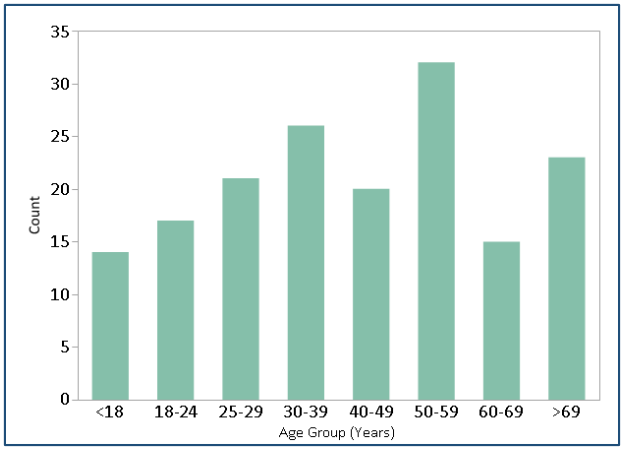
Hepatitis A virus (HAV) causes acute liver disease, is infectious, and can be prevented by vaccination. HAV is shed in the feces of an infected person and can be transmitted when an unprotected person consumes contaminated food or water or has close contact with an infected person. Most young children under 6 years of age do not have symptoms with HAV infection whereas, more than 70% of older children and adults are likely to have symptoms that include jaundice. Recovery from HAV provides life-long immunity. Although this virus does not result in chronic infection, acute infection in persons with compromised immune systems can be serious.[7]

In 2015, a total of 1,390 cases of hepatitis A infection were reported in the US, a 12.2% increase from the number of reported cases in 2014. However, the incidence rate remained the same from 2014 to 2015 at 0.4 per 100,000 population.[7] In Georgia, new HAV infections (acute cases) have declined from a previous high of more than 900 cases reported in 2001 (11.1/100,000 population) to an annual average of only 34 cases between 2012 and 2016 (Figure 2.1), with the 2016 rate matching the 2014-2015 national rate (0.4 per 100,000 population). This remarkable decrease in HAV infections can be attributed to the availability of hepatitis A vaccine and the May 2006 national recommendations to immunize children.[8] Georgia took a tiered approach by requiring universal hepatitis A vaccination of children born on or after January 1, 2006 who were entering daycare, beginning in 2007; in 2011, it was required for daycare, kindergarten and 6th grade entry. Over the past five years, HAV infections in children ages 1 to 17 years were rare in Georgia, comprising only 8% of reported cases; most HAV cases occurred in adults (median age 42 years). (Figure 2.2) While recent case numbers have been low, and many cases had undetermined

Figure 2.1: Reported Hepatitis A Infections, Georgia, 2007-2016

Source: SendSS

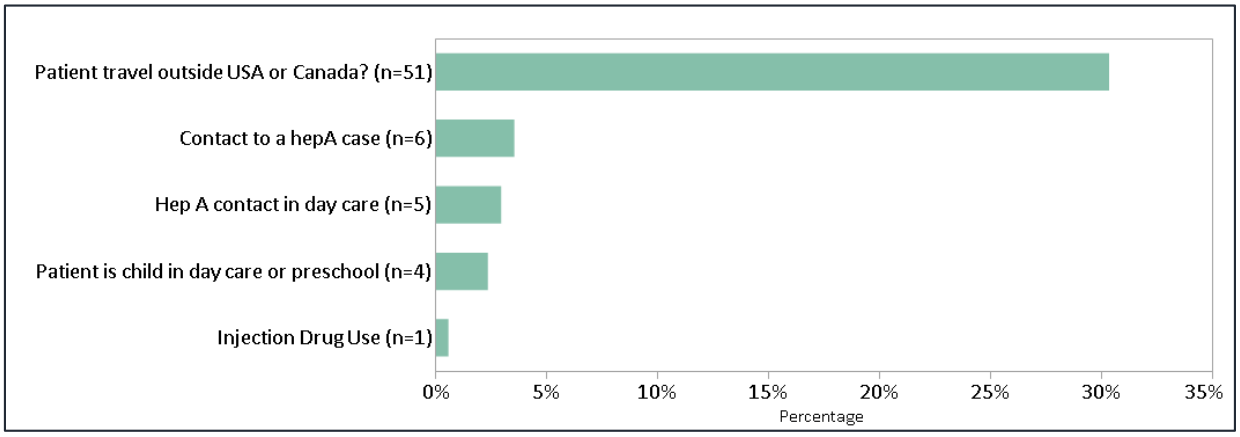
Figure 2.2: Reported Hepatitis A Infections by Age Group, Georgia, 2012-2016



Source: SendSS

sources of infection, international travel made up the greatest risk factor (30.4%) among HAV cases reported in Georgia during the past five years. (Figure 2.3)

Figure 2.3: Reported Risk Factors for Hepatitis A Infections, Georgia, 2012-2016



Source: SendSS

References

[7] Centers for Disease Control and Prevention; 2017. https://www.cdc.gov/hepatitis/hav

[8] Centers for Disease Control and Prevention. Prevention of hepatitis A through active or passive immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2006; 55(No. RR-7).

Hepatitis B

Hepatitis B virus (HBV) causes acute liver disease that can be transmitted through exposure to blood or body fluids (semen, vaginal fluid). Common exposure risks for HBV include unprotected sexual contact; sharing needles, syringes, or other drug-injection equipment; or during birth from an infected mother to baby. As a bloodborne pathogen, HBV is transmitted via direct blood-to-blood exposure or sexual contact. Symptoms of acute HBV infection can include nausea, vomiting, abdominal pain, fatigue, dark urine, and/or jaundice. Hepatitis B infection in pregnant women is of particular concern, due to the potential for transmission to their newborns who are at risk of perinatal HBV infection.

For most adults, HBV infection can resolve in three to six months after exposure, leaving the recovered person immune to HBV; however, HBV can progress to a life-long chronic infection, leaving a person infectious to others and at increased risk for developing cirrhosis and/or primary hepatocellular carcinoma (liver cancer), and leading to end-stage liver disease.

According to CDC, there were an estimated 20,900 new HBV infections reported in the U.S. in 2016, with about one-half of chronic HBV infections occurring in Asian/Pacific Islanders.[9] In Georgia, there were 1,875 confirmed HBV infections (acute and chronic) reported in 2016, with 35% occurring among Asian/Pacific Islanders (Table 3.1). Georgia has a large immigrant and refugee population, mainly from Asian and African countries. Georgia's HBV surveillance data show that when country of birth was reported, a large percentage of chronic hepatitis B infections were diagnosed in persons who were foreign-born, and most acute cases occurred in U.S.-born persons. Of 51% of chronic HBV infections reporting country of birth in 2016, 44% were born outside of the U.S. In contrast, of the 26% of acute cases reporting country of birth, only 5% were foreign born.

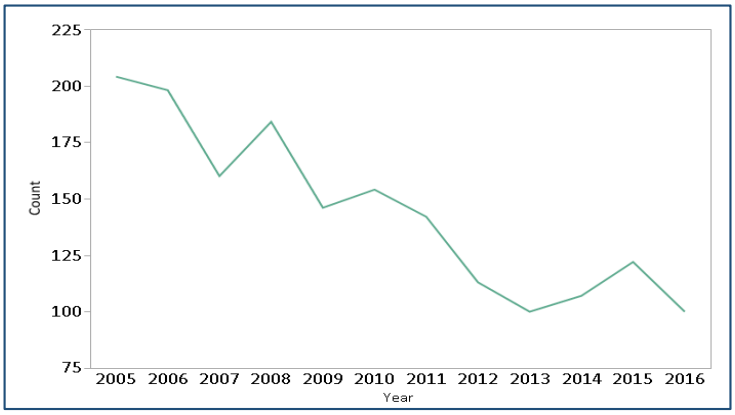
Table 3.1 also compares acute and chronic HBV case counts and percentages by race. While most newly-reported chronic HBV infections in Georgia in 2016 occurred were in Asian and Black or African American populations (34% each), only 14% were White. As Georgia's population by race in 2016 was 61% White and 32% Black or African American[10], acute HBV cases occurred disproportionately among White (51%) and Black or African American (36%) populations; Asians and Hispanics had the lowest rates (1% and 3%, respectively) of acute HBV infections

Table 3.1: Demographic Characteristics of Persons with Acute and Chronic Hepatitis B Infections, Georgia, 2016

Demographic Characteristics	Acute Hepatitis B		Chronic Hepatitis B	
	Count	Percentage	Count	Percentage
Total	**99**	-	**1776**	-
Gender				
Female	33	33%	756	43%
Male	66	67%	1016	57%
Unknown	0	0%	4	0.2%
Race				
American Indian/Alaskan Native	0	0%	1	0.1%
Asian	1	1%	603	34%
Black or African American	36	36%	607	34%
Hawaiian/Pacific Islander	0	0%	2	0.1%
Multiracial	1	1%	4	0.2%
Other	3	3%	25	1%
Unknown	8	8%	292	16%
White	50	51%	242	14%
Ethnicity				
Hispanic	3	3%	57	3%
Non-Hispanic	87	88%	1427	80%
Unknown	9	9%	292	16%
Age Group (Years)				
Under 15	0	0%	10	1%
15-24	0	0%	109	6%
25-34	27	27%	384	22%
35-44	29	29%	408	23%
45-54	23	23%	407	23%
55-64	16	16%	289	16%
65+	4	4%	168	9%
Unknown	0	0%	1	0.1%
US/Foreign Born				
US Born	21	21%	121	7%
Foreign Born	5	5%	776	44%
Unknown	73	74%	879	49%

Georgia's acute HBV case counts have fallen from more than 200 cases in 2005 to 99 cases in 2016 (Figure 3.1); however, during the years 2012-2016, acute HBV infections among adults in Georgia increased.

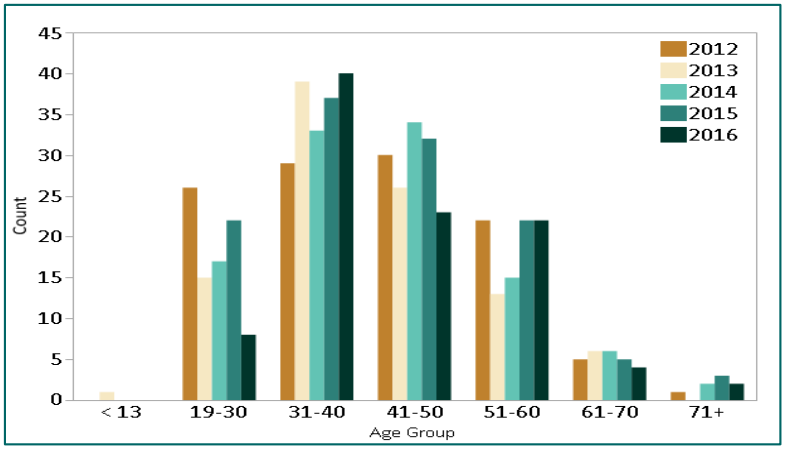
Figure 3.1: Confirmed Acute HBV Infections, Georgia, 2005-2016



Source: SendSS

Acute HBV infections in persons ≤18 years of age have not been reported in Georgia since 2013. (Figure 3.2) This can be attributed to Georgia's school immunization law requiring hepatitis B vaccinations in children born on or after January 1, 1992, for daycare and school entry. By 2016, the oldest students affected by this requirement had reached 24 years of age. As shown in Figure 3.2, there was a dramatic drop in acute HBV infections in the age group 19-30 years in 2016. These infections occurred primarily in those ages 27-30 years of age. The majority of acute HBV cases occurred among unvaccinated adults in the age group 31-40 years (40%). Note that there were no reported cases of acute HBV infection in those between 14-18 years of age during between 2012 and 2016.

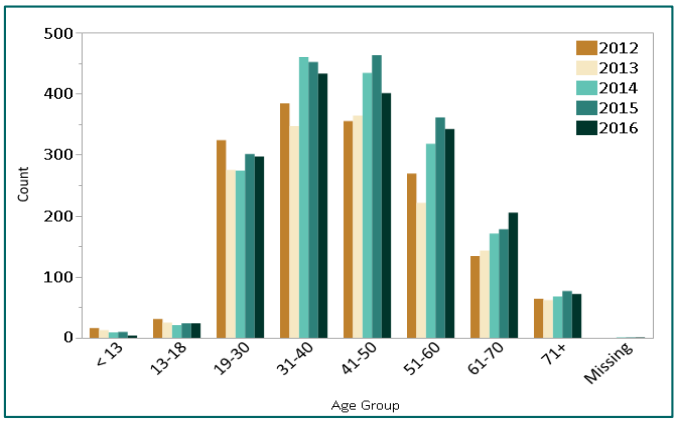
Figure 3.2: Acute Hepatitis B Infections, by Age Group, Georgia, 2012-2016



Source: SendSS

In contrast to acute HBV infections in Georgia, the number of chronic HBV infections reported by age group (Figure 3.3) remained fairly stable from

Figure 3.3: Chronic Hepatitis B Infections, by Age Group, Georgia, 2012-2016

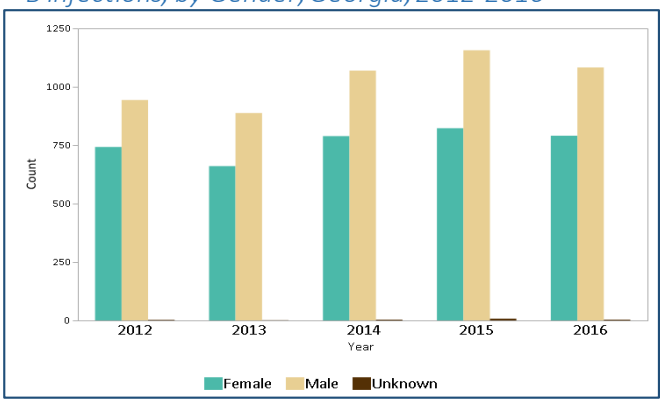


Source: SendSS

2012-2016. This is largely due to routine screening of refugees and immigrants of all ages.

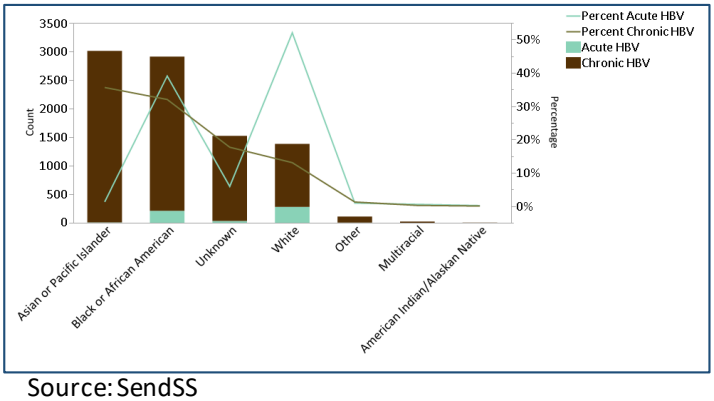
Also, there were consistently larger numbers of acute and chronic HBV infections reported in males than in females (Figure 3.4). The majority of chronic HBV infections were reported among Asian or Pacific Islanders, whereas the majority of acute HBV infections were reported among Whites (52%), followed by

Figure 3.4: Confirmed (Acute and Chronic) Hepatitis B Infections, by Gender, Georgia, 2012-2016



Source: SendSS

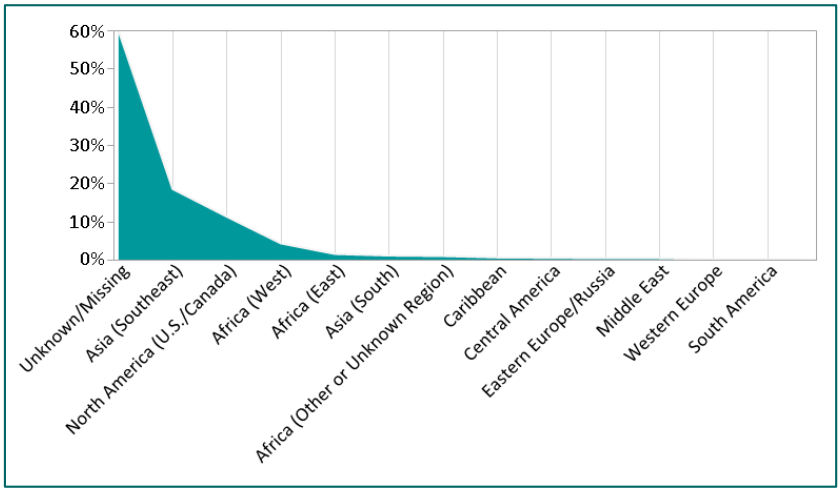
Figure 3.5: Confirmed (Acute and Chronic) Hepatitis B Infections by Race, Georgia, 2012-2016



Source: SendSS

Black or African Americans (39%). (Figure 3.5) Although the country of birth data was often missing or unknown for the majority (of the confirmed acute or chronic HBV cases reported in Georgia during 2012-2016, approximately 19%) were among those born in Asia, followed by the U.S/Canada and Africa. (Figure 3.6)

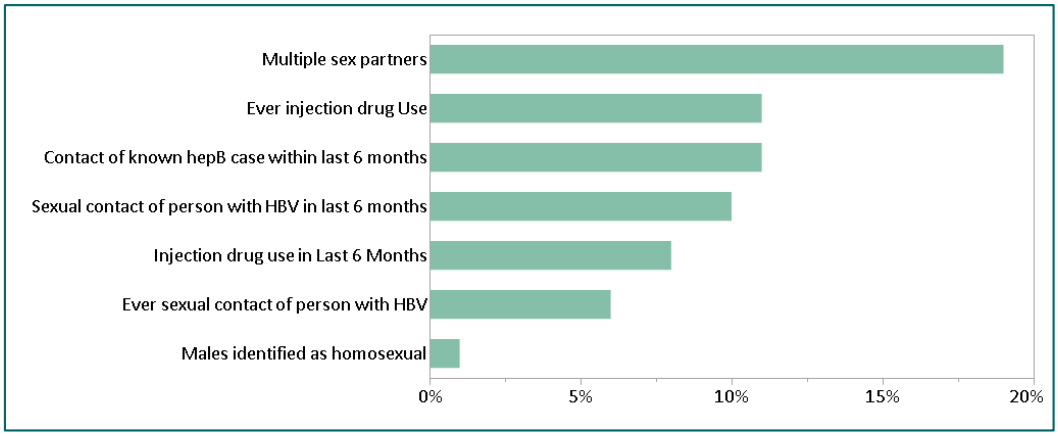
Figure 3.6: Confirmed (Acute and Chronic) Hepatitis B Infections by Patient's Geographic Region of Birth, Georgia, 2012-2016



Source: SendSS

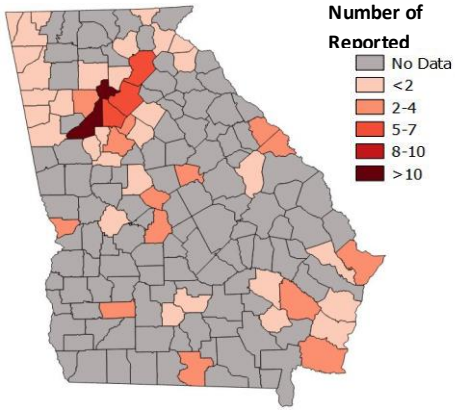
Of the acute HBV cases for which risk factors were documented (Figure 3.7) during 2012-2016,, 19% were attributed to having multiple sex partners in the six months prior to symptom onset; 11% had contact with a known hepatitis B case within the past 6 months; 11% reported ever injecting drugs; and 8% reported injection drug use in the six months prior to symptom onset.

Figure 3.7: Reported Risk Factors for Acute Hepatitis B Infections, Georgia, 2012-2016



Source: SendSS

Figure 3.8: Acute Hepatitis B Infections, Georgia, 2016 (n=99)

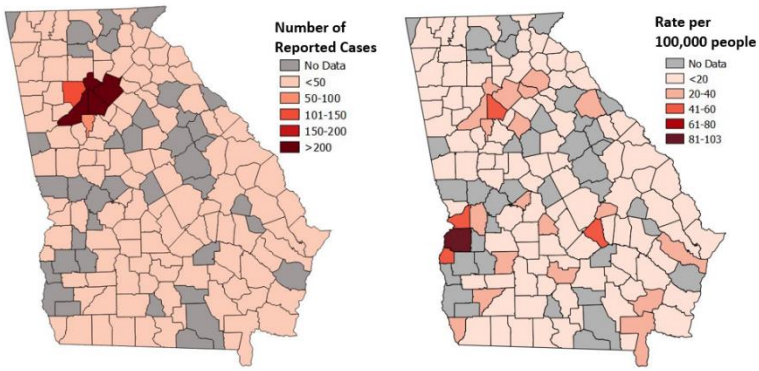


Source: SendSS

Historically in Georgia, acute HBV infections are reported in greater numbers in the more densely populated metropolitan Atlanta counties. The map of 2016 cases in Figure 3.8 shows this to be true; however, it is also apparent that acute HBV infections cases were also documented in North, Central, and Southeast Georgia in more sparsely populated rural regions of the state. These geographic areas of Georgia overlap with locations where increasing hepatitis C infections in young adults have been documented since 2012, due to the growing opioid and heroin epidemics.

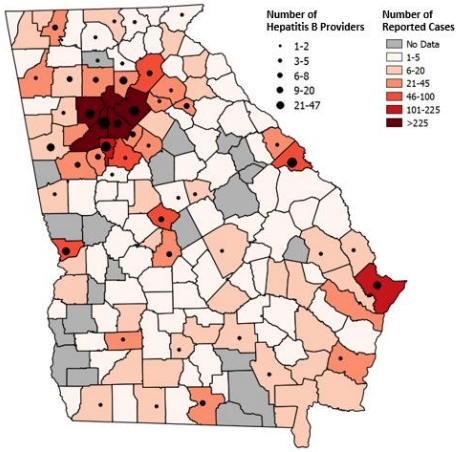
Figure 3.9 shows the county locations of chronic HBV infections reported in 2016 in Georgia, by number of cases and rate per 100,000 population. Newly identified chronic infections

Figure 3.9: Chronic Hepatitis B Infections, Georgia, 2016 (n=1,776)



Source: SendSS

Figure 3.10: Distribution of Hepatitis B Treatment Providers and Rate of Confirmed Acute and Chronic Hepatitis B Infections (n=3,865) by County, Georgia, 2015-2016



were distributed statewide, with the most notable density in the metro Atlanta area, where large populations of immigrants and refugees reside.

A continuing barrier to healthcare access in Georgia, as well as other states, is the lack of providers available that offer hepatitis B care and treatment, especially in rural areas of the state. The map in Figure 3.10 shows that the majority of HBV patients reside and where the location of healthcare providers are primarily in the metro-Atlanta area. This distribution demonstrates the obvious need for medical providers to manage the care and treatment of HBV-infected persons living outside of the metro Atlanta area, especially in Central and South Georgia.

Source: SendSS; Georgia Viral Hepatitis Resource Directory (https://dph.georgia.gov/sites/dph.georgia.gov/files/related_files/site_page/ADES_Georgia_Viral_Hepatitis_Resource_Directory.pdf)

References:

[9] Centers for Disease Control and Prevention. Surveillance for Viral Hepatitis – United States, 2016: https://www.cdc.gov/hepatitis/statistics/2016surveillance/commentary.htm

[10] U.S. Census: www.census.gov

Perinatal Hepatitis B

HBV can be vertically transmitted from an infected mother to her newborn at birth by parenteral or mucosal exposure. Transmission can occur from blood exposure through microscopic tears and abrasions during labor and delivery. Intra-uterine infections can occur through threatened abortion, but are rare and account for less than 2% of infections[11]. Breastfeeding is not a mode of transmission and is not contraindicated for HBV-infected mothers. As many as 90% of infant HBV infections will progress to chronic infection, placing the child at risk for developing liver cancer or dying prematurely[12].

The goals of Georgia DPH's Perinatal Hepatitis B Prevention Program (PHBPP) are to identify all pregnant women who are infected with HBV by monitoring reported hepatitis B surface antigen (HBsAg)-positive test results, and to ensure their infants receive and complete timely postexposure prophylaxis (PEP), complete hepatitis B (HepB) vaccination and postvaccination serologic testing (PVST). CDC estimates that 18,945-26,444 births will occur to HBsAg-positive women each year in the U.S., with 544 to 865 of those births occurring in Georgia.

Transmission

Perinatal HBV transmission from mother to infant at birth is very efficient. If the mother is positive for both HBsAg and hepatitis B "e" antigen (HBeAg), 70%–90% of infants will become infected by age 6 months in the absence of PEP with HBIG and HepB vaccine. The risk of perinatal transmission is about 10% if the mother is positive for HBsAg only.

Children who are not infected at birth remain at risk from long-term interpersonal contact with their infected mothers. In one study, 38% of infants who were born to HBsAg-positive mothers and who were not infected perinatally became infected by age 4 years[11]. HBV can survive outside the body at least 7 days. During that time, the virus can cause infection if it enters the body of a person who is not infected. Sharing items such as toothbrushes and nail clippers with an infected person should be avoided. According to CDC, there have been instances in which HBV has been spread to infants when they received food pre-chewed by an infected person. This practice should be avoided.

Postexposure Prophylaxis (PEP)

Infants born to HBsAg-positive mothers must receive PEP to help prevent HBV transmission. PEP with HBIG and HepB vaccine administered 12–24 hours after birth, followed by completion of a 3-dose HepB vaccine series, has been demonstrated to be 85%–95% effective in preventing acute and chronic HBV infection in infants born to women who are positive for both HBsAg and HBeAg[11]. HBIG provides passively acquired anti-HBs and temporary protection (i.e., for 3–6 months) when administered in standard doses[11]. Studies are limited on the maximum interval

after exposure during which PEP is effective, but the interval is unlikely to exceed 7 days for perinatal exposures.

In birth cohorts 2013-2015, 940 (98.5%) of 954 HBV-exposed infants received PEP with HBIG and HepB within 7 days of birth. Of the 14 infants that failed to receive PEP, 4 infants were successfully recalled for HBIG administration within 7 days of birth.

HBV in Pregnancy

The American Congress of Obstetrics and Gynecologists (ACOG) endorses CDC's universal screening recommendation that prenatal care providers should test every woman for HBsAg during an early prenatal visit (e.g., in the first trimester), even if a woman has been previously vaccinated or tested. The presence of a confirmed HBsAg result is indicative of ongoing HBV infection. All HBsAg-positive persons should be considered infectious[11].

All Georgia physicians, laboratories and other healthcare providers are required by law (O.C.G.A 31-12-2) to report HBsAg-positive pregnant women to DPH within 7 days of laboratory confirmation. Failure to report these women to DPH places the woman and her newborn at risk of missing critical interventions to prevent disease transmission.

Antiviral Treatment

All HBsAg-positive persons are infectious, but those who are also HBeAg-positive are more infectious because their blood contains higher titers of HBV, typically 107– 109 virions/mL[11]. The American Association for the Study of Liver Diseases (AASLD) recommends that pregnant women with viral loads above 200,000 IU/mL receive antiviral treatment to reduce the risk of perinatal transmission[13]. Several studies have found that immunoprophylaxis failure occurs primarily among infants born to women with HBeAg-positivity and HBV DNA levels above 200,000 IU/mL[13].

In April 2016, the Georgia PHBPP began collecting antiviral treatment data, HBeAg status, and HBV DNA status for women with an Estimated Date of Confinement (EDC) or delivery date between April 1, 2016 and March 31, 2017. Among 361 tracked cases, 27 women were known to be HBeAg-positive. Eleven of the 27 (41%) were prescribed antiviral treatment. Among all 361 tracked cases, 10 women had reported HBV DNA levels greater than 200,000 IU/mL. Seven (70%) of the 10 were prescribed antiviral treatment; all 10 were also HBeAg-positive (Table 4.1).

Table 4.1: Antiviral treatment among HBsAg-positive pregnant women with Estimated Date of Confinement (EDC) or infant DOB during the observation period, by HBV DNA and HBeAg status, Georgia, April 1, 2016 - March 31, 2017

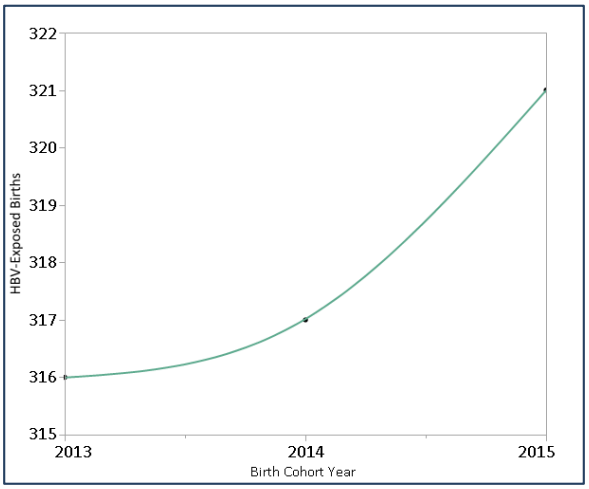
HBV DNA and HBeAg status	Number of pregnant women prescribed antivirals			Total
	Yes	No	Unknown	
HBV DNA >200,000 IU/mL	**7**	**2**	**1**	**10**
HBeAg positive	7	2	1	10
HBeAg negative	0	0	0	0
HBeAg unknown	0	0	0	0
HBV DNA ≤200,000 IU/mL	**7**	**44**	**49**	**100**
HBeAg positive	1	1	6	8
HBeAg negative	3	26	17	46
HBeAg unknown	3	17	26	46
HBV DNA level unknown	**7**	**63**	**181**	**251**
HBeAg positive	3	2	4	9
HBeAg negative	2	6	21	29
HBeAg unknown	2	55	156	213
Total	**21**	**109**	**231**	**361**

Burden of Disease

HBV-Exposed Births

The Georgia PHBPP identified 954 (0.24%) live births to HBsAg-positive women during 2013-2015 (Figure 4.1; detailed data can be found in Appendix Table 4.2). CDC estimates that 544 to 865 infants are born to HBsAg-positive women in Georgia each year. Unfortunately, less than half of these infants are identified by the Georgia PHBPP and receive case management services. This leaves the other half at risk to potentially fail to receive critical interventions that could prevent disease transmission. Medical care providers and laboratories that fail to report cases to DPH contribute to the case

Figure 4.1: Identified HBV-Exposed Births, Georgia, 2013-2015



identification gap. Even with reporting challenges, Georgia has increased the number of HBsAg-positive pregnant women identified annually through capture/recapture methods and other enhanced surveillance mechanisms.

HBsAg-Positive Mother Demographics

Age at Delivery

In birth cohorts 2013-2015, 302 (32%) births occurred in HBsAg-positive women 30-34 years of age at the time of delivery (Figure 4.2; detailed data can be found in Appendix Table 4.3). Additionally, 297 (31%) births occurred in women classified with advanced maternal age (35 years of age and older). The youngest reported age at delivery was 18 years, with the median age at delivery being 32 years. The oldest reported age at delivery was 50 years.

Figure 4.2: HBV-Exposed Births by Mother's Age at Delivery, Georgia, 2013-2015

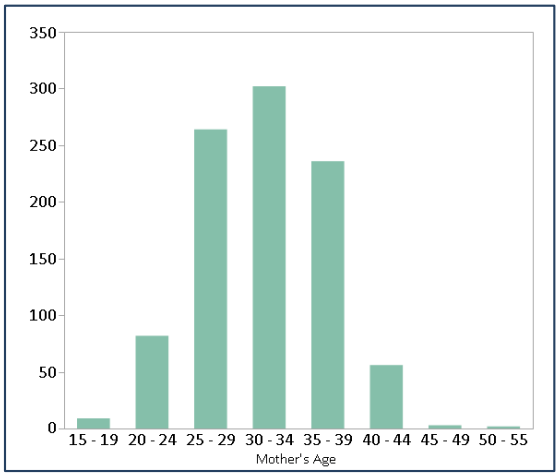
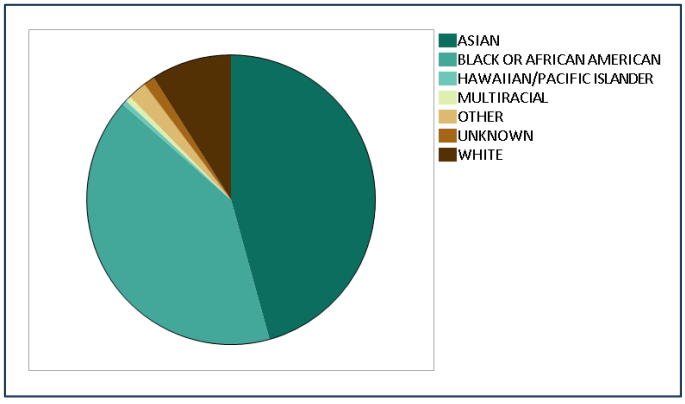


Figure 4.3: HBV-Exposed Births by Mother's Race, Georgia 2013-2015



Race

Asian women accounted for 436 (46%) of all HBV-exposed births in years 2013-2015 (Figure 4.3; detailed data can be found in Appendix Table 4.4). Black or African American women were the second largest racial group for HBV-exposed births with 389 (41%) births during the 3-year period. White women accounted for 86 (9%) of the births and Hawaiian/Pacific Islanders and Multiracial women attributed to less than <1% of births. A total of 32 births did not have the mother's race available and were listed as "other" or "unknown."

Ethnicity

Only 34 (4%) of the documented 954 HBsAg-positive women who gave birth reported their ethnicity as Hispanic. We were unable to identify the ethnicity of 22 women who delivered in the 2013-2015 birth cohort. (Appendix Table 4.5)

Country of Birth

In birth cohorts 2013-2015 in Georgia, 737 (77%) HBsAg-positive mothers reported their birth country to be other than the United States, with 76 different countries documented. These foreign-born women likely acquired HBV at birth or in early childhood through contact with an infected mother or close household contact while living in a HBV-endemic area. The largest percentage of births occurred to HBsAg-positive women who reported being born in Asia and Africa where HBV is endemic. (Appendix Table 4.6 and 4.7)

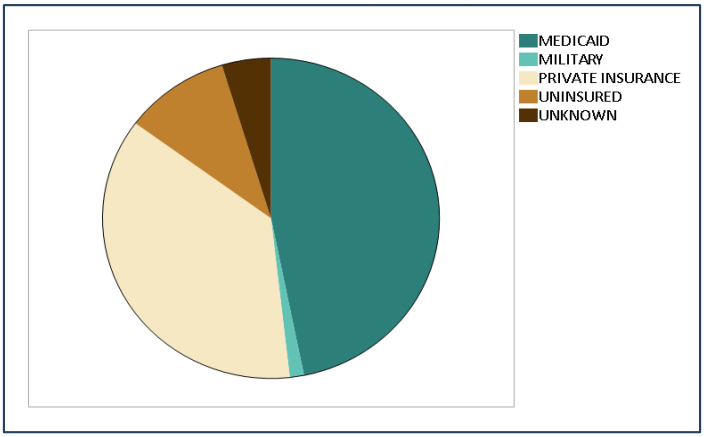
Additionally, 216 (23%) of these mothers reported being born in the United States; 21 (2%) did not identify a country of birth. Of the women reporting the United States as their country of birth, numbers were highest among black or African American women (134 / 62%), white women (44 / 20%) and Asian women (28 / 13%).

HBV is endemic in all countries of Africa and the majority of South Asia[11]. In Georgia, 233 (24%) of HBsAg-positive births occurred in women born in Africa and 401 (42%) occurred in women born in South and Southeast Asia.

Insurance Status

Insurance coverage was reported by 812 (85%) of the HBsAg-positive women who delivered in 2013-2015 (Figure 4.4; detailed data can be found in Appendix Table 4.8). Medicaid was the largest source of reported coverage and accounted for 447 (47%) of the insurance types. Private insurance accounted for 352 (37%) and military coverage was the reported type for only 13 (1%) of the women. Uninsured women comprised 97 (10%) of those women who delivered during this timeframe. We were unable to determine the type of insurance coverage for 45 (5%) of the HBsAg-positive mothers.

Figure 4.4: HBV-Exposed Births by Mother's Insurance Status at Delivery, Georgia, 2013-2015



The mother's insurance coverage type may be an indicator of other assistance services her newborn and family may need. Uninsured and underinsured infants are eligible to receive HepB vaccine at low cost or no-cost through the federal Vaccines for Children (VFC) Program and qualify for other services offered through DPH.

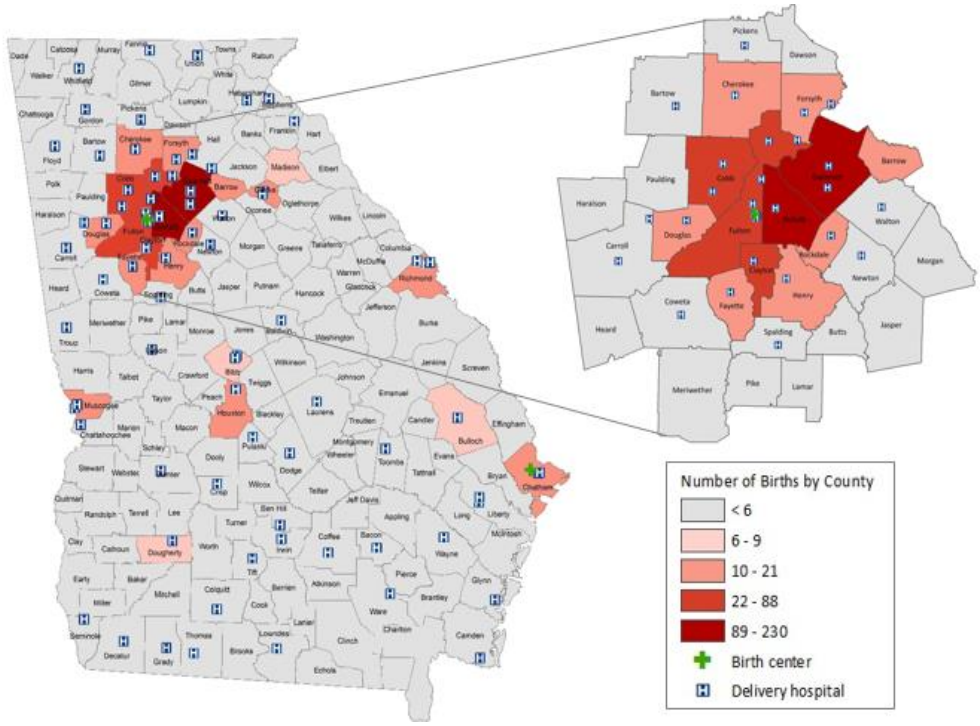
Geographic Distribution

The Georgia PHBPP identified 954 live births to HBsAg-positive women in years 2013–2015. Figure 4.5 shows the number of HBV-exposed births that were identified in 2013-2015 by their county of residence. The locations of Georgia's 81 delivery facilities are plotted on the map. Georgia has 79 delivery hospitals and 2 birthing centers.

The majority of births occurred in 12 of the 29 counties within the Atlanta Metropolitan Statistical Area (MSA): Gwinnett County 230 (24.1%), DeKalb 180 (18.9%), Cobb 82 (8.6%), Fulton 88 (9.2%), Clayton 54 (5.7%), Forsyth 17 (1.8%), Henry 17 (1.8%), Douglas 14 (1.5%), Cherokee 12 (1.3%), Barrow 10 (1.1%), Fayette 10 (1.1%), and Rockdale 10 (1.1%), accounted for 751 (78%) births to HBsAg-positive mothers.

Figure 4.6 displays counts of live births to HBsAg-positive women in the 29 counties in the Atlanta MSA. The MSA is based on U.S. Census data and is delineated by the U.S. Office of Management and Budget for the purpose of federal data collection and reporting[14]. The Atlanta MSA is used as a basis for statistical reporting by DPH's HIV Prevention Program and the Department of Community Health.

Figures 4.5 and 4.6: Identified HBV-Exposed Births by County, Georgia, 2013-2015

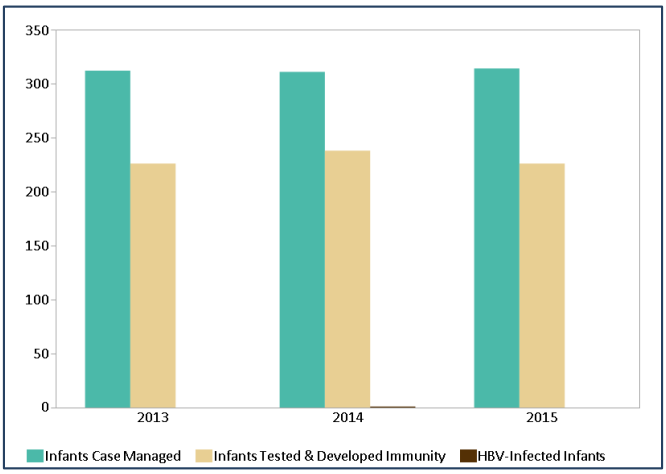


Postvaccination Serologic Testing (PVST)

Infants and young children (aged <10 years) with HBV are typically asymptomatic, therefore HBV infection may be missed without testing[11]. Postvaccination serologic testing (PVST) is recommended for infants and children born to HBsAg-positive mothers. Serologic testing confirms whether the child has developed immunity after vaccination or has been infected with HBV despite vaccination. The PVST should include HBsAg and hepatitis B surface antibody (anti-HBs). Testing should occur between 9 and 12 months of age.

The Georgia PHBPP case managed 937 HBV-exposed infants born in birth cohorts 2013-2015. (Figure 4.7; detailed data can be found in Appendix Table 4.9)

Figure 4.7: PVST Outcomes for Case-Managed Infants and Children. Georgia. 2013-2015



Case management activities included working with the family to ensure the infant completed the HepB vaccine series and PVST. Of the infants that completed HepB vaccination and PVST, 74% of case managed infants developed adequate anti-HBs levels that indicated immunity to HBV. Fewer than 5 case managed infants became infected with HBV. The HBV-infected infants experienced breakthrough infections, despite postexposure prophylaxis.

The Georgia PHBPP continues to have challenges with PVST completion. Many pediatric providers are unfamiliar with the national recommendations and do not order PVST for HBV-exposed infants, or do not order within the recommended testing timeframe and either delay testing or test too soon. Additionally, some providers fail to order the HBsAg and anti-HBs laboratory tests together, which makes it difficult to determine an infant's immune status.

Another barrier to completion of vaccination and PVST are clients who are transient and move out of Georgia. In Georgia, we have noted trends of mothers delivering in Georgia and returning to their home countries with the infant soon after birth. Also, cultural practices of having extended family care for a newborn in the mother's home country during the first few years of life present challenges in documenting protective antibody status. These cases are unable to be tracked, leaving these infants vulnerable to HBV infection.

Public Health Implications

The Public Health goal is to prevent perinatal HBV transmission. Prenatal care providers can assist DPH with narrowing the gap of missed HBV cases by testing every woman, every pregnancy for HBsAg. Providers and laboratories must report HBsAg-positive pregnant cases to DPH within 7 days of laboratory confirmation; failure to report does not prompt a public health response and places HBV-exposed infants at risk of "falling through the cracks" of public health intervention.

Completion of PVST can be challenging due to cultural beliefs or stigmas and the loss of contact with transient populations. Strategies to improve PVST completion rates must be encouraged and implemented through cooperation between the Georgia PHBPP and pediatric care providers, by following national recommendations to order PVST at 9-12 months of age for HBV-exposed infants.

References

[11]Centers for Disease Control and Prevention. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP); Part 1: Immunization of Infants, Children, and Adolescents. MMWR 2005;54(No. RR-16).

[12]Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

[13]Norah A. Terrault, Natalie H. Bzowej, Kyong-Mi Chang, Jessica P. Hwang, Maureen M. Jonas, and M. Hassan Murad. AASLD Guidelines for Treatment of Chronic Hepatitis B. Hepatology 2015.

[14]U.S. Census Bureau. Patterns of Metropolitan and Micropolitan Population Change: 2000 to 2010, 2010 Census Special Reports, C2010SR-01, U.S. Government Printing Office, Washington, DC, 2012.

Appendix Table 4.2: HBV-Exposed Births, Georgia, 2013–2015

BIRTH COHORT YEAR	GEORGIA BIRTHS	HBV-EXPOSED BIRTHS (%)
2013	128,511	316 (0.25)
2014	130,776	317 (0.24)
2015	131,333	321 (0.24)
TOTAL BIRTHS	**390,620**	**954 (0.24)**

Appendix Table 4.3: HBV-Exposed Births by Mother's Age at Delivery, Georgia, 2013–2015

AGE GROUP	2013	2014	2015	TOTAL (%)
15 - 19	4	3	2	9 (1)
20 - 24	37	23	22	82 (9)
25 - 29	82	90	92	264 (28)
30 - 34	92	107	103	302 (32)
35 - 39	76	78	82	236 (25)
40 - 44	24	15	17	56 (6)
45 - 49	1	0	2	3 (0)
50 - 55	0	1	1	2 (0)
TOTAL	**316**	**317**	**321**	**954 (100)**

Appendix Table 4.4: HBV-Exposed Births by Mother's Race, Georgia, 2013–2015

MOTHER'S RACE	2013	2014	2015	TOTAL (%)
ASIAN	147	157	132	436 (46)
BLACK OR AFRICAN AMERICAN	122	127	140	389 (41)
HAWAIIAN/PACIFIC ISLANDER	0	3	2	5 (<1)
MULTIRACIAL	3	2	1	6 (<1)
OTHER	5	5	10	20 (2)
WHITE	33	22	31	86 (9)
UNKNOWN	6	1	5	12 (1)
TOTAL BIRTHS	**316**	**317**	**321**	**954 (100)**

Appendix Table 4.5: HBV-Exposed Births by Mother's Ethnicity, Georgia, 2013-2015

MOTHER'S ETHNICITY	2013	2014	2015	TOTAL (%)
HISPANIC	11	5	18	34 (4)
NON-HISPANIC	296	308	294	898 (94)
UNKNOWN	9	4	9	22 (2)
TOTAL BIRTHS	**316**	**317**	**321**	**954 (100)**

Appendix Table 4.6: Top 10 Reported Countries of Birth for HBsAg-Positive Mothers, Georgia, 2013–2015

BIRTH COUNTRY	2013	2014	2015	TOTAL (%)
UNITED STATES	70	69	77	216 (23)
CHINA	33	45	38	116 (12)
VIETNAM	49	21	37	107 (11)
NIGERIA	18	20	15	53 (6)
BURMA	18	14	10	42 (4)
GHANA	10	14	12	36 (4)
ETHIOPIA	14	9	3	26 (3)
LIBERIA	8	5	12	25 (3)
KOREA	6	11	7	24 (3)
PHILIPPINES	5	8	7	20 (2)
TOTAL BIRTHS	**231**	**216**	**218**	**665 (70)**

Appendix Table 4.7: Geographic Regions of HBsAg-Positive Mothers, Georgia, 2013–2015

GEOGRAPHIC REGION	2013	2014	2015	TOTAL (%)
AFRICA (EAST)	19	17	7	43 (5)
AFRICA (OTHER OR UNKNOWN REGION)	4	6	13	23 (2)
AFRICA (WEST)	51	52	64	167 (18)
ASIA (SOUTH)	6	9	5	20 (2)
ASIA (SOUTHEAST)	134	127	120	381 (40)
CARIBBEAN	9	8	6	23 (2)
CENTRAL AMERICA	8	2	13	23 (2)
EASTERN EUROPE/RUSSIA	9	4	6	19 (2)
MIDDLE EAST	1	0	2	3 (0)
NORTH AMERICA (U.S./CANADA)	70	71	78	219 (23)
OCEANIA	0	1	0	1 (0)
SOUTH AMERICA	0	2	3	5 (1)
UNKNOWN/MISSING	5	15	1	21 (2)
WESTERN EUROPE	0	3	3	6 (1)
TOTAL BIRTHS	**316**	**317**	**321**	**954 (100)**

Appendix Table 4.8. HBV-Exposed Births by Mother's Insurance Status at Delivery, Georgia, 2013-2015

COVERAGE TYPE	2013	2014	2015	TOTAL (%)
MEDICAID	150	158	139	447 (47)
MILITARY	3	4	6	13 (1)
PRIVATE INSURANCE	101	114	137	352 (37)
UNINSURED	30	30	37	97 (10)
UNKNOWN	32	11	2	45 (5)
TOTAL BIRTHS	**316**	**317**	**321**	**954 (100)**

Appendix Table 4.9. PVST Outcomes for HBV-Exposed Infants and Children Managed by the PHBPP, Georgia, 2013-2015

BIRTH YEAR	INFANTS CASE MANAGED	TESTED & DEVELOPED IMMUNITY	DEVELOPED IMMUNITY (%)	HBV-INFECTED INFANTS
2013	312	226	72%	0
2014	311	238	77%	<5
2015	314	226	72%	0
TOTAL	**937**	**690**	**74%**	**<5**

Hepatitis C

Hepatitis C virus (HCV) is a blood borne pathogen that affects the liver. HCV is spread when blood from someone infected with HCV enters the body of someone that is not infected. The most common route of transmission is through percutaneous exposure (direct passage through the skin). Prior to 1992, before the blood supply was screened for HCV, many people in the U.S. were infected through blood transfusions. The most common routes of transmission include sharing needles, syringes, or other paraphernalia used to prepare or inject drugs; needlestick injuries; or during birth from a mother infected with HCV to the baby. Although less common, someone can also become infected with HCV through tattooing if sterile needles and ink are not used; sexual exposure; or sharing personal items that may have traces of blood. HCV cannot be spread through casual contact.[15]

Only approximately 25% of people will experience symptoms when first infected with HCV. These symptoms may include fever, fatigue, dark urine, clay-colored stools, abdominal pain, loss of appetite, nausea, vomiting, joint pain, and/or jaundice. It is estimated that 15-25% of people will clear the virus within 6 months of being infected without treatment. However, 75-85% will develop a chronic, or lifelong, infection. Chronic HCV infection, if untreated, can lead to serious complications, such as liver damage, cirrhosis, or liver cancer. CDC estimates that there were over 41,000 new (acute) HCV infections in 2016 and that are approximately 2.4 million people in the U.S. living with chronic HCV infection.[15]

Core Surveillance

Available surveillance data from the State Electronic Notifiable Disease Surveillance System (SendSS) was analyzed to determine the burden and epidemiology of HCV in Georgia. Please note that Georgia HCV surveillance data is limited and data depicted below is provisional and may not depict the true burden of HCV in Georgia. Further, due to the large volume of HCV infections reported and lack of program capacity, DPH surveillance efforts focus on those age 30 years and younger; therefore, demographic and risk factor may not be known for the majority of reported HCV infections.

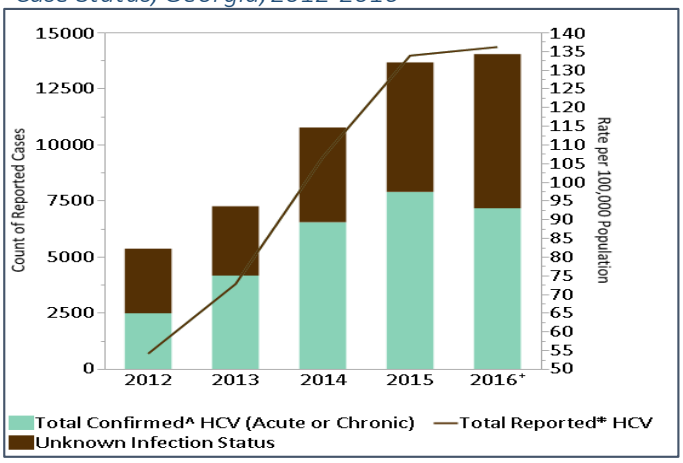
Note that the new case definitions for acute and chronic hepatitis C cases were implemented in 2016. This definition lowers the threshold for inclusion as a case. As a result, increases in acute HCV case counts and rates in 2016 may be, in part, indicative of the change in case counting methodology.

^HCV infections are confirmed acute or chronic based on current CSTE case definitions.

*Total Reported includes confirmed cases as well as those with unknown infection status (positive antibody only reported). Note that negative HCV laboratory results are not reportable in Georgia.

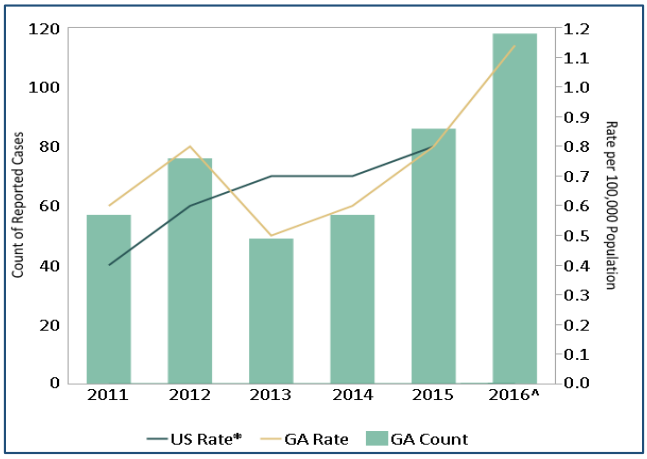
Between 2012 and 2016, 51,094 patients were reported with a positive HCV laboratory results, with nearly 23,000 patients not having adequate criteria to determine currently infection status (only a positive HCV antibody reported). *Note that negative HCV RNA by PCR results are not currently reportable in Georgia.* Between these years, a total of 28,252 confirmed acute and chronic HCV infections were reported. Figure 5.1 shows the increases that have been seen in Georgia in both acute and chronic infections as well as the increases in the rate of total reported cases, which includes confirmed and those with unknown current infection status. In 2012, CDC released a new age based testing recommendation for baby boomers (anyone born between 1945 and 1965) to be tested at least once for HCV. This testing recommendation may explain the increases in positive labs being reported to the Georgia DPH.

Figure 5.1: Count and Rate of Hepatitis C Infections by Case Status, Georgia, 2012-2016



Source: SendSS

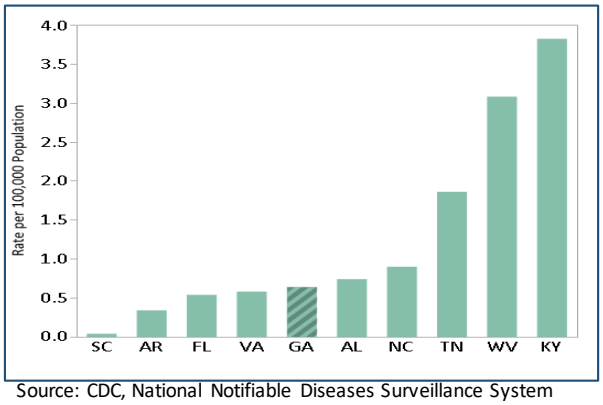
Figure 5.2: Count and Rate of Reported Hepatitis C Confirmed Acute Cases, Georgia and United States, 2011-2016



*Reported cases of acute hepatitis C, nationally and by state and jurisdiction —United States, 2011-2015. https://www.cdc.gov/hepatitis/statistics/2015surveillance/index.htm

Between 2012 and 2016, a total of 386 acute HCV infections were identified in Georgia. There was a 55% increase in acute HCV infections from 2012 and 2016. The count and rates of acute HCV have been steadily increasing since 2013. Rates of acute HCV infection were similar to rates being seen for the U.S. U.S. rates were unknown for 2016 at the time of this analysis. (Figure 5.2) Compared to other Southeastern U.S. states,

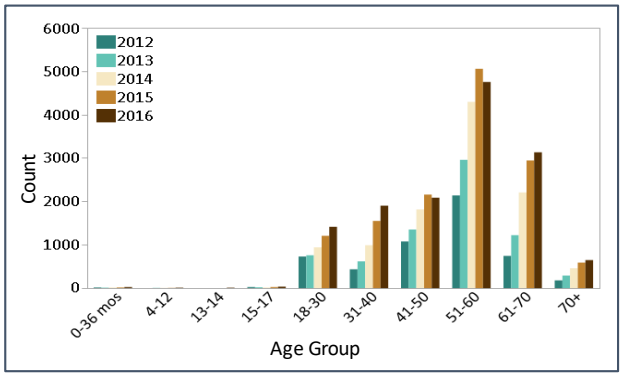
Figure 5.3: Average Rate of Reported Confirmed Acute Hepatitis C Cases Submitted to CDC by Selected Southeastern States, 2011-2015



Source: CDC, National Notifiable Diseases Surveillance System
Note: Reports may not reflect unique cases.
Note: Southeastern states with no data have been removed.

Georgia rates are lower compared to rates being seen in Appalachian states, such as Kentucky, West Virginia, and Tennessee but on par with other SE states, such as Alabama, Virginia, and Florida. (Figure 5.3)

Figure 5.4: Total Reported Hepatitis C Infections by Age Group, Georgia, 2012-2016*



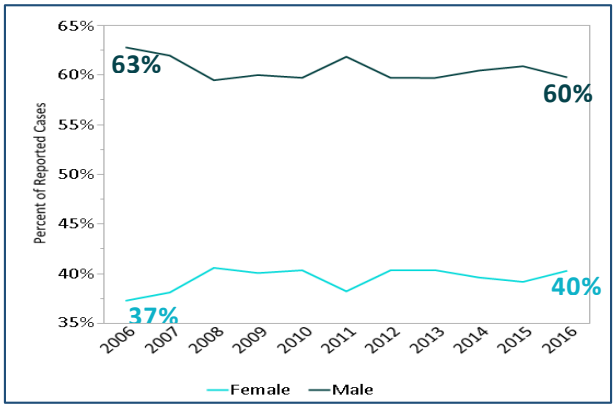
Source: SendSS

to increase surveillance capacity so that the epidemiology of acute HCV infections statewide can be better assessed.

Overall, when looking at the gender breakdown of all reported HCV infections, approximately 60% of cases being reported are among males. (Figure 5.5) However, the gender breakdown is more even for acute HCV infections, with 45% of cases being among females and 55% being among males. (Figure 5.6) Looking further at the breakdown between gender and age group (Figure 5.7), as expected those between the ages of 50 and 64 years were predominately male (34%); whereas, the younger age groups were more evenly male and female.

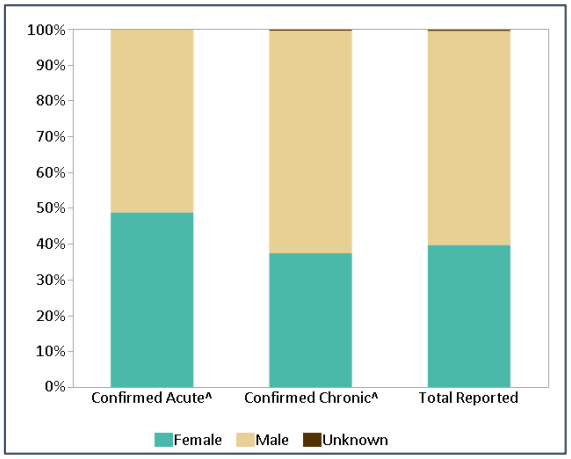
Nationally, increases in HCV infections are being seen among young adults, primarily in those between 18 and 30 years of age. Due to the limited capacity surveillance efforts focus on this age group. Figure 5.4 shows a steady increase in total reported HCV in the 18-30 year old age group between 2012 and 2016. Unexpectedly, larger increases in Georgia are being seen in those between 31 and 40 years of age. Due to the limited capacity within the Georgia DPH to conduct epidemiologic investigation, it may be likely that acute HCV infections are not being identified in the 31-40 year old age group. This analysis shows a need

Figure 5.5: Percent of Total Reported Hepatitis C Infections by Gender, Georgia, 2006-2016*



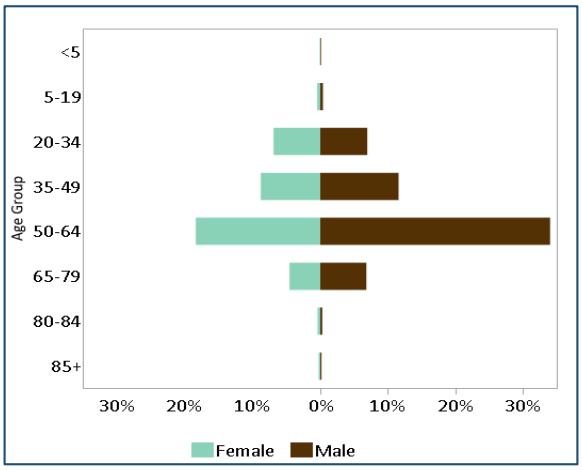
Source: SendSS

Figure 5.6: Hepatitis C Infections by Case Status and Gender, Georgia, 2012-2016



Source: SendSS

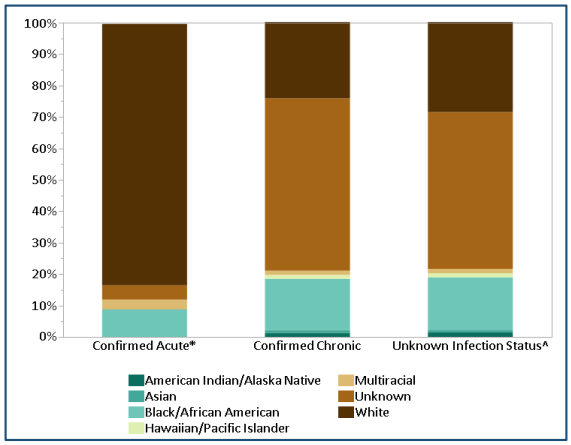
Figure 5.7: Total Reported Hepatitis C Infections by Age Group and Gender, Georgia, 2012-2016*



Source: SendSS

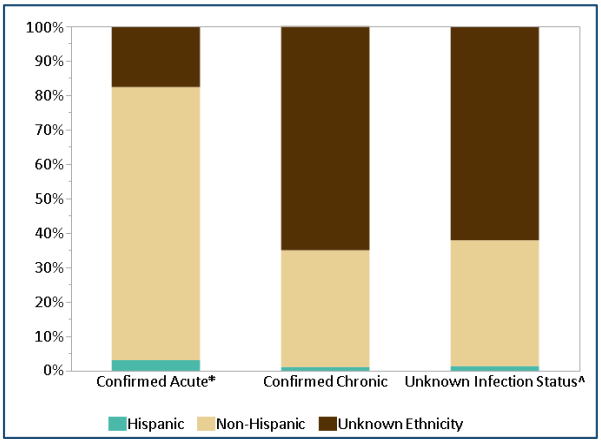
As seen in Figure 5.8, acute HCV infections between 2012 and 2016 occurred predominantly among Whites (83%); whereas, only 9% occurred among African Americans. Race is unknown for the majority (64%) of the chronic HCV infections; however, 16% of chronic HCV infections occurred among African Americans and 26% were among Whites. Figure 5.9 shows that the majority of acute HCV infections between 2012 and 2016 were among non-Hispanics (79%). Ethnicity is largely unknown for chronic HCV infections, but 34% were also among non-Hispanics during the same time period.

Figure 5.8: Percent of Hepatitis C Reports by Case Status and Race, Georgia, 2012-2016



Source: SendSS

Figure 5.9: Percent of Hepatitis C Reports by Case Status and Ethnicity, Georgia, 2012-2016



Source: SendSS

Geographic Distribution of HCV Infections in Georgia

National trends have shown that rural areas are seeing the highest rates of acute HCV infections. In 2016, similar trends were seen in the Georgia, with the majority of identified acute HCV infections being seen in rural areas of North Georgia. (Figure 5.10) As expected the majority of chronic HCV infections in 2016 were seen in the metro-Atlanta area; however, rural areas of the state had higher rates of infection, particularly in Southeast and Central Georgia. (Figure 5.11)

Figure 5.10: Confirmed Acute Hepatitis C Infections by County, Georgia, 2016 (n=90)

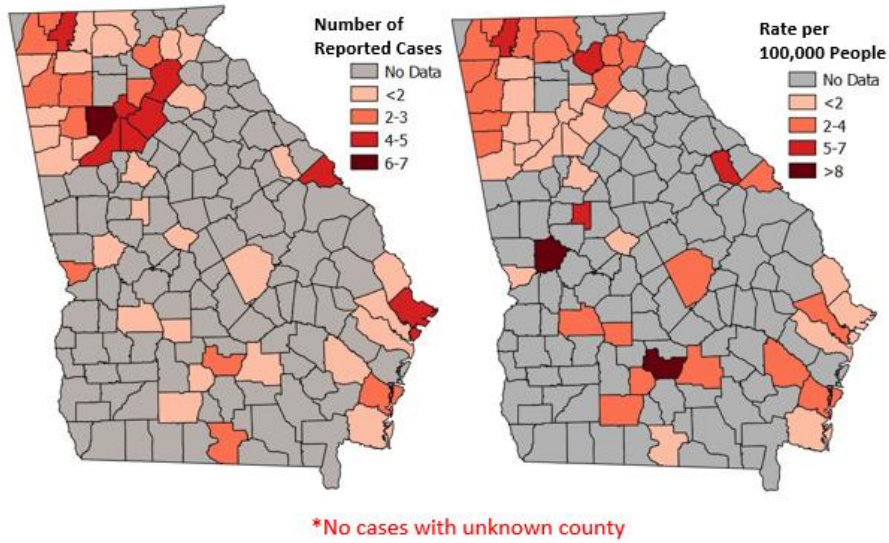
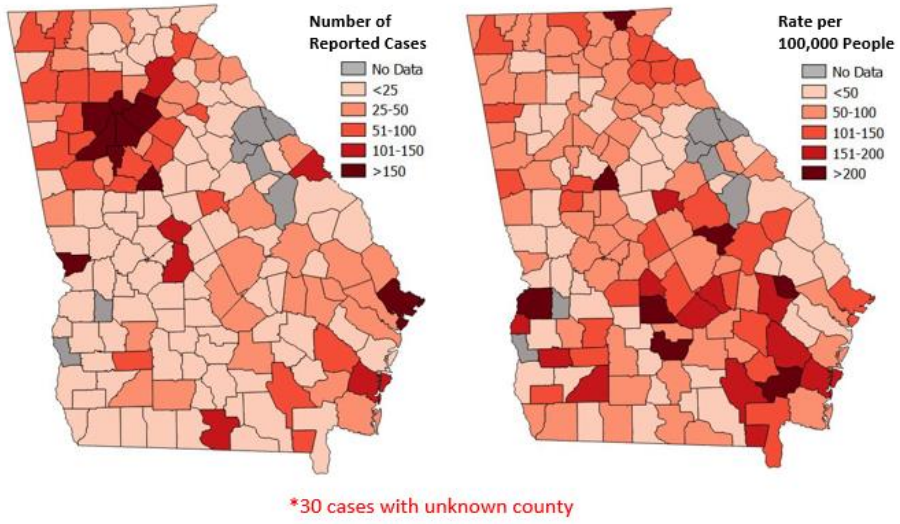


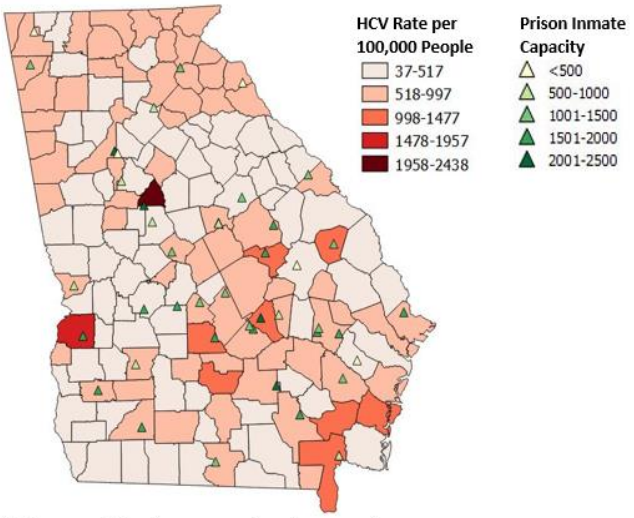
Figure 5.11: Confirmed Chronic Hepatitis C Infections by County, Georgia, 2016 (n=7,044)



Source: SendSS

In analyzing the geographic location of reported HCV infections, it was determined that many infections were reported from prisons statewide, with the patient's address being the location of the prison rather than the patient's home residence. Therefore, the geographic distribution of the total reported HCV infections were assessed with locations and inmate capacity of state and federal prisons. (Figure 5.13) Between 2012 and 2016, higher rates of HCV infections were reported to DPH from counties that had a prison. There were also higher rates of HCV infection in those counties with prisons with a large inmate capacity. DPH is unable to determine inmates' resident addresses and rely on the address reported by the laboratory, which in many cases is the address of the prison where the inmate is incarcerated.

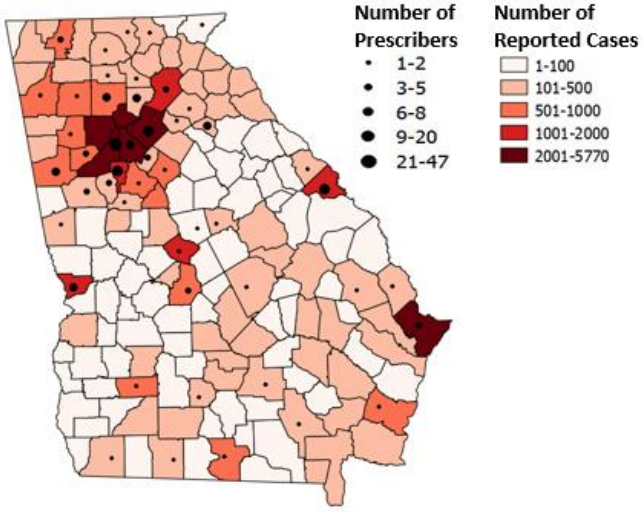
Figure 5.13: Total Reported Hepatitis C Infections (n=51,094) by County with Prison Locations by Inmate Capacity, Georgia, 2012-2016



*854 cases with unknown county not mapped

Source: SendSS, Georgia Department of Corrections

Figure 5.14: Distribution of Hepatitis C Treatment Providers and Number of Total Reported Hepatitis C Infections (n=51,094) by County, Georgia, 2012-2016



The lack of healthcare providers, especially in rural areas of the state, continues to be a barrier faced by patients in need of HCV care and treatment. Figure 5.14 shows that the majority of HCV patients reside and where the location of healthcare providers are primarily in the metro-Atlanta area. South and Central Georgia, however, have very few providers offering HCV care and treatment services. This distribution demonstrates the obvious need for medical providers to manage the care and treatment of HCV-infected persons living outside of the metro Atlanta area.

Source: SendSS; Georgia Viral Hepatitis Provider Directory

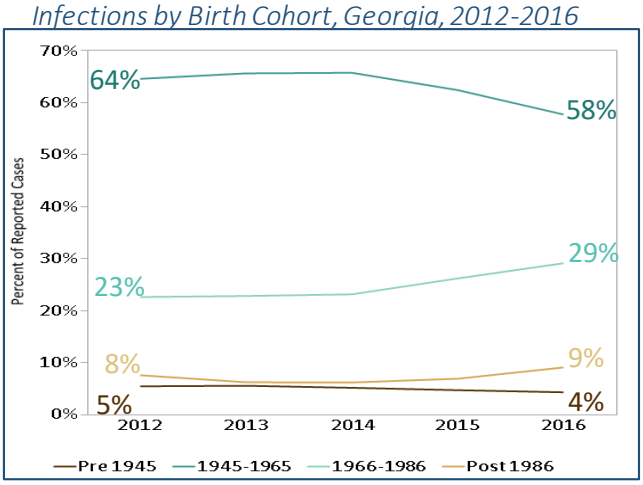
Hepatitis C Infections by Age Cohort

In 2012, the CDC released HCV testing recommendations all adults born between 1945 and 1965 (baby boomers) to receive one-time testing for HCV. CDC estimates that approximately 75% of chronic HCV infections in the U.S. are among baby boomers and that this age cohort is 5 times more likely to be infected with chronic HCV infection than other age groups. Baby boomers also accounted for 73% of HCV-related mortality in the U.S.[16]

Acute HCV infections had been declining in the U.S until 2010. However, incidence of HCV infections began increasing in 2010 and CDC estimates a 3.5 fold increase in acute HCV infections in the U.S. in 2016. The largest increase of acute HCV infections has been among young adults (those 20-29 years of age), primarily a result of the opioid epidemic and increases in injection drug use.[17]

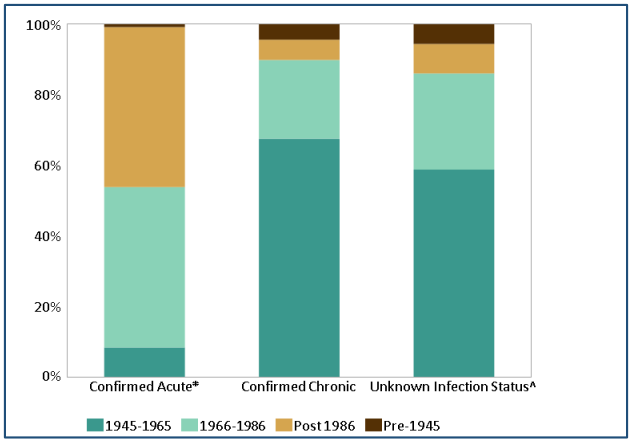
Available surveillance data was analyzed reported HCV infections among various age cohorts and determine if trends in Georgia compare to those being seen nationally. As seen in Figure 5.15, 58% of HCV infections reported in 2016 were among baby boomers, a 6% decrease compared to 2012. Those age 30 years and younger accounted for 9% of total reported HCV infections in 2016, compared to 8% of reported infections in 2012. Those born between 1966 and 1986 accounted for 29% of reported infections in 2016, a 6% *increase* compared to 2012.

Figure 5.15: Percent of Total Reported Hepatitis C Infections by Birth Cohort, Georgia, 2012-2016



Source: SendSS

Figure 5.16: Hepatitis C Infections by Birth Cohort and Case Status, Georgia, 2012-2016



Source: SendSS

As seen in Figure 5.16, between 2012 and 2016, there were almost as many acute HCV infections identified in those born post-1986 (45%) as there were among those born between 1966 and 1986 (44%). As expected, the majority (65%) of chronic HCV infections were among baby boomers. Similar to trends seen in Figure 5.4, these analyses show a need to increase surveillance efforts in those over 30 years of age.

References:

[15] CDC, Viral Hepatitis, https://www.cdc.gov/hepatitis/hcv/index.htm

[16] CDC https://www.cdc.gov/hepatitis/populations/1945-1965.htm

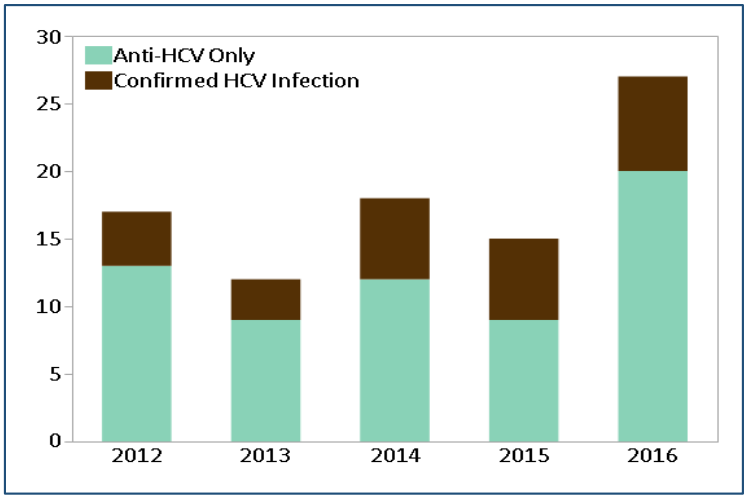
[17] CDC, Viral Hepatitis Surveillance, 2016
https://www.cdc.gov/hepatitis/statistics/2016surveillance/pdfs/2016HepSurveillanceRpt.pdf

Perinatal Hepatitis C

Vertical transmission of HCV occurs in approximately 6% of infants born to women infected with HCV. The risk is doubled for infants born to women who are also co-infected with HIV and women who have a high hepatitis C viral load at time of delivery.[18] There are currently no biologic interventions to prevent mother-to-child transmission of HCV, as there are for perinatal hepatitis B prevention. With the increase in HCV infections among women of childbearing age, especially those ages 30 years and younger, comes a potential increase in the number of newborns exposed to and infected with HCV during birth.

Approximately 25% to 40% of infected children will spontaneously clear HCV by age 2 years; however, another 6% to 12% may clear the virus before adulthood.[19] It is recommended by CDC that exposed infants be tested for HCV antibody after 18 months of age. Testing prior to this age may result in false positive results due to detection of maternal antibodies. As an option, HCV RNA testing can be performed earlier, at age 1 to 2 months and should be repeated after 12 months of age.[20] The prevalence of HCV in children is estimated to be between 0.05% and 0.36%.[19] This is most likely underestimated, as HCV testing is not routinely conducted during prenatal care, unless a risk factor is known or assessed by the provider. Also, pediatric care providers may not be aware that testing is needed.

Figure 6.1: Reported Hepatitis C Infections in Babies ≤ 36 Months of Age, Georgia, 2012-2016



Note: Hepatitis C surveillance data are limited and based on availability in SendSS. Data above may not depict the true burden of perinatal hepatitis C infections in Georgia. Data reflect HCV infections first reported in given year.

There are limited surveillance data about perinatal HCV both nationally and in Georgia. Based on the proposed 2018 CSTE case definition for perinatal HCV infection, core HCV surveillance data were analyzed to determine the extent of perinatal HCV in Georgia. During 2102-2016, reported cases of HCV infection among infants <36 months of age increased in Georgia (Figure 6.1). Georgia has seen a nearly 60% increase in cases being reported for infants 36 months of age or younger, with only a small proportion being reported with a confirmed infection (HCV RNA positive). However, further analysis of reported cases showed that the majority of these children were not tested for HCV antibody according to CDC recommendations (Table 6.1): only 13% of cases reported to DPH between 2012 and 2016 were tested appropriately. Georgia does not require reporting of

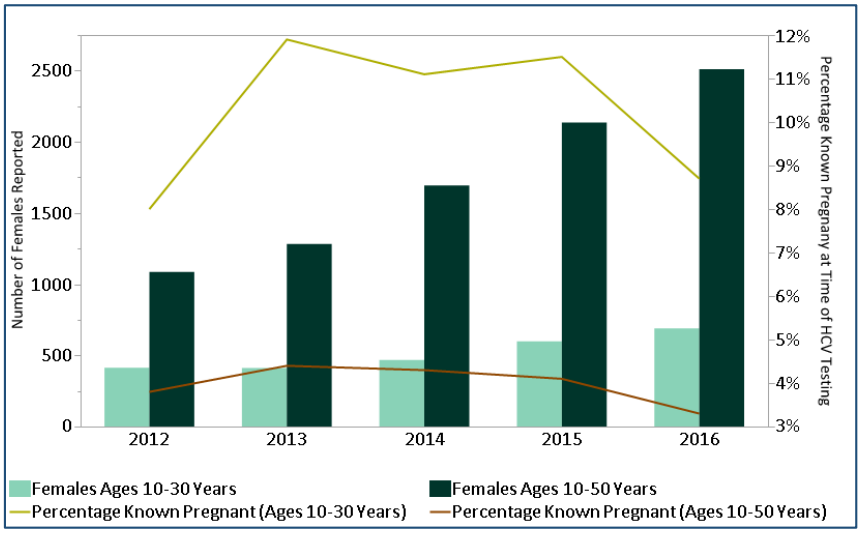
negative HCV lab results; therefore, DPH is unable to determine how many babies were tested for HCV with negative results.

Table 6.1: Perinatal^ Hepatitis C Infections and Provider Testing, Georgia, 2012-2016

	Total Reported Perinatal HCV*	Tested Correctly	Antibody tested too early	PCR tested too early	PCR tested at ≥2 months, but not ≥12 months
	Cases (%)	**Cases (%)**	**Cases (%)**	**Cases (%)**	**Cases (%)**
2012	**17 (19.1)**	3 (17.6)	11 (64.7)	2 (11.8)	1 (5.9)
2013	**12 (13.5)**	3 (25.0)	7 (58.3)	0 (0.0)	2 (16.7)
2014	**18 (20.2)**	2 (11.1)	11 (61.1)	0 (0.0)	5 (27.8)
2015	**15 (16.9)**	4 (26.7)	7 (46.7)	1 (6.7)	3 (20.0)
2016	**27 (30.3)**	5 (18.5)	17 (63.0)	2 (7.4)	3 (11.1)
Total	**89 (100)**	12 (13.5)	36 (40.4)	3 (3.4)	11 (12.4)

* Total reported includes confirmed acute, confirmed chronic, and cases with unknown infection status.
^Perinatal hepatitis C includes cases ≤36 months of age at the time of testing.
Note: Hepatitis C surveillance data are limited and based on availability in SendSS. Data above may not depict the true burden of perinatal hepatitis C infections in Georgia. Data reflect HCV infections first reported in given year.

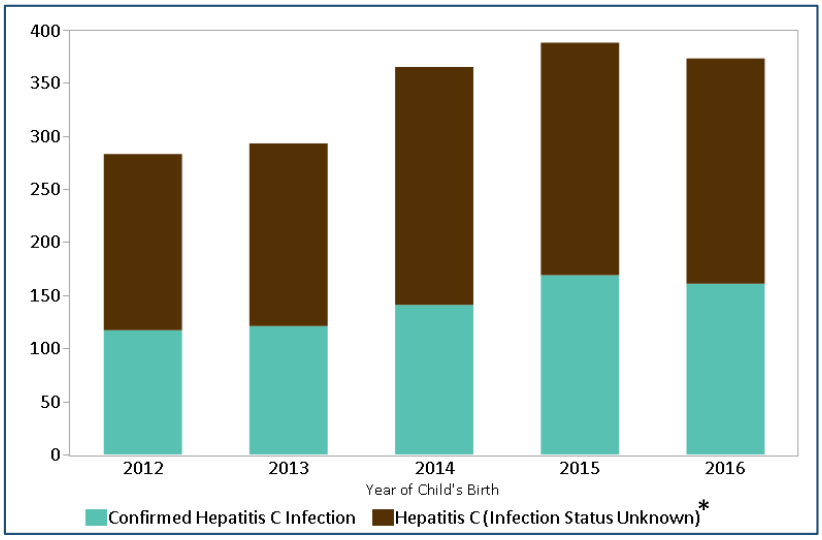
Figure 6.2: Reported Pregnancy Status at Time of Hepatitis C Testing, by Age Group, Georgia, 2012-2016



Note: Hepatitis C surveillance data are limited and based on availability in SendSS. Data above may not depict the true burden of perinatal hepatitis C infection in Georgia. Data reflect females reported in a given year with confirmed HCV infections and females with unknown infection status (HCV antibody only).

The Georgia PHBPP defines women of childbearing age as being between 10 and 50 years of age. With the increasing number of HCV infections among young adults, further analysis of surveillance data was conducted to compare the reported pregnancy status in women age 10 to 50 years to younger women aged 10 to 30 years. This analysis shows that there was a higher percentage of females between the ages of 10 and 30 years of age that were pregnant at the time of their reported HCV diagnosis, compared to those of childbearing age (10 to 50 years old). (Figure 6.2) However, all reported cases are not investigated and pregnancy status may be unknown for the majority of reported cases.

Figure 6.3: Number of Newborns Potentially Exposed to Hepatitis C at Birth, by Mother's Infection Status, Georgia, 2012-2016



Source: SendSS and Georgia Vital Records, Birth Records
*Hepatitis C cases with unknown infection status are those where only positive HCV antibody results are available.
Note: Hepatitis C surveillance data are limited and based on availability in SendSS. Data above may not depict the true burden of perinatal hepatitis C infection in Georgia.

Under the assumptions that at-risk women may not have been tested for HCV (prior to or during pregnancy) and that babies exposed at birth may not have been tested for HCV, we matched with birth records from Georgia DPH Vital Records, based on the mother's first name, last name, and date of birth. This data matching showed that between 2012 and 2016, there were 709 births to women with confirmed HCV infections and an additional 993 births to women reported with only a positive HCV antibody result (Figure 6.3). Of the 709 births to women with a confirmed HCV infection, it is unknown how many of those babies have been tested for HCV or if pediatricians are aware of potential exposure to HCV and that testing is needed. Further testing is also needed to confirm infection for those women with only HCV antibody test results.

References:

[18] CDC. Increased Hepatitis C Virus (HCV) Detection in Women of Childbearing Age and Potential Risk for Vertical Transmission – United States and Kentucky, 2011-2014. MMWR; 65 (28); 705-710.

[19] Squires JE, Balistreri WF. Hepatitis C virus infection in children and adolescents. Hepatology Communications; 2017;1(2):87-98.

[20] CDC. https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm.

Viral Hepatitis Testing

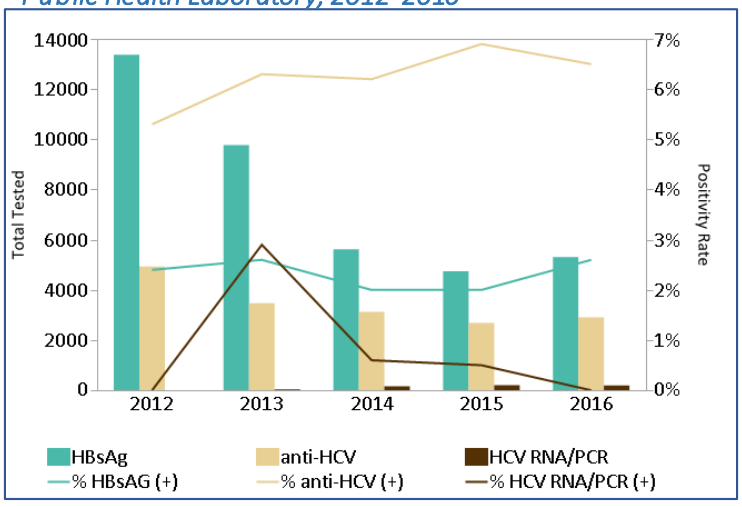
One of the keys to addressing the burden of hepatitis B and hepatitis C is by screening to identify those infected with either virus or co-infected with both. Georgia DPH has prioritized viral hepatitis prevention efforts by targeting vaccination and testing conducted at public health clinics and community based organizations as well as supporting hepatitis C screening efforts from external partners.

Public Health Testing

Each of Georgia's 159 counties has at least one health department, and public health clinics throughout Georgia have the capacity to conduct viral hepatitis testing through the Georgia Public Health Laboratory (GPHL). Hepatitis A (Total anti-HAV, IgM anti-HAV), hepatitis B (HBsAg, anti-HBs, anti-HBc, HBeAg), and hepatitis C (anti-HCV, HCV RNA/PCR) testing is available through GPHL. In 2013, GPHL began accepting specimens for HCV RNA/PCR testing and in Fall 2016, anti-HCV testing with reflex to HCV RNA/PCR was initiated.

Prior to July 2013, there was no charge to health departments for GPHL to perform hepatitis B testing panels. However, effective July 1, 2013, GPHL began imposing fees for most routine testing, including hepatitis B ($13.50). GPHL charges $10 per test for hepatitis C antibody (anti-HCV/EIA with signal to cut-off ratio (s/co) serology and $50.75 for HCV RNA/PCR. Additionally, as of October 2016, anti-HCV with reflex to HCV RNA/PCR was implemented as an option for Public Health clinics, with the cost for HCV RNA/PCR only being charged when it is conducted. Additional administrative fees, as determined by each of the 18 Georgia Health Districts, are charged to patients by the county health departments for all testing services. A sliding fee scale is available, so patients may be charged a reduced amount or no fee at all, if they are unable to afford the current fees.

Figure 7.1: Hepatitis B and Hepatitis C Testing, Georgia Public Health Laboratory, 2012-2016



Source: Data obtained from GPHL.

Data obtained from GPHL shows that although the total number of people tested for HBsAg has decreased dramatically since 2012, the overall positivity rate has remained steady, between 2% and 3%. (Figure 7.1) The decrease in hepatitis B testing at GPHL may be due to the initiation of fees in 2013. Also, a decrease in testing and lower positivity rates among young adults may be partly the result of Georgia's school immunization law, which has required children and students born

on or after January 1, 1992 to be vaccinated against hepatitis B. That early birth cohort turns 25 years old in 2017, leaving fewer susceptible adults under age 25.

Testing for anti-HCV at GPHL has also decreased slightly since 2012. However, the hepatitis C positivity rate remained stable at 5%-7%, demonstrating that targeted HCV testing for at-risk populations, based on CDC recommendations, is proving to be successful.

Data from GPHL were further examined based on the type of public health clinic where testing was conducted in 2015 and 2016. (Figures 7.2, 7.3) As expected, the highest HBV positivity rates were among those tested in Refugee Health, TB, and HIV clinics. (Note that Refugee Health Clinics also use a commercial laboratory for viral hepatitis testing; therefore, the number of tests shown in Figure 7.2 does not fully represent HBV testing conducted in those sites.) The highest rates of HCV antibody testing were seen in STD and HIV clinics, as well as "other clinic" settings.

Overall, these results show that HBV and HCV testing in public health settings has played an integral part in identifying Georgians infected with HBV and/or HCV. These data will allow DPH to gain a better understanding of the burden of viral hepatitis in Georgia and the need for linkages to HBV and HCV care services, which is necessary to effectively channel resources and improve clinical outcomes among those infected with viral hepatitis.

Figure 7.2: Total Tested for HBsAg and Positivity Rate, by Public Health Clinic Type, Georgia, 2015-2016

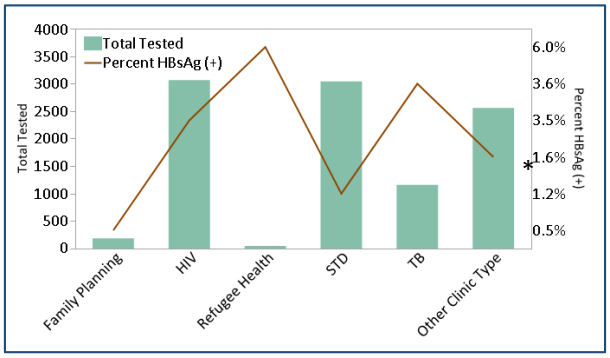
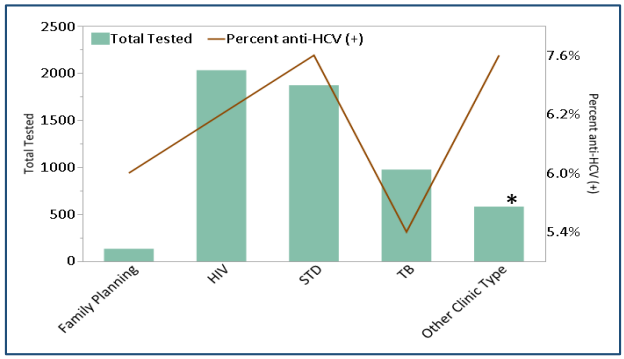


Figure 7.3: Total Tested for anti-HCV and Positivity Rate, by Public Health Clinic, Georgia, 2015-2016



Source: Data obtained from GPHL.
Note that anti-HCV testing was not conducted in Refugee Health clinics during this time.
*Other Clinic Types includes County Health Departments, Mobile Units or Satellite Clinics; Teen Clinics; Infectious Disease Clinics, Private Practices; and/or Other State Facilities

Hepatitis C Testing Initiative

In 2015, the DPH Hepatitis Program initiated a pilot HCV testing project with community based organizations (CBOs) and health departments. Additionally, since the state FY 2015, the Georgia Legislature has allotted funds to the DPH Epidemiology Program specifically for HCV testing. This additional funding has allowed DPH to support rapid HCV antibody testing within both CBOs and health departments. Community based organizations that also provided HIV prevention and testing services were identified to participate in this testing initiative. Health departments in areas with high burdens of HCV also participate in this initiative. Figure 7.4 shows locations of sites participating in DPH's HCV testing initiative. It is also important to note that rapid HCV testing has been implemented in health departments in all four counties identified in CDC's *County-level Vulnerability to Rapid Dissemination of HIV/HCV Infection among Persons who Inject Drugs*.[21] In 2016, funding for HCV RNA PCR testing was added for health department sites. This support has allowed health departments to identify patients with confirmed HCV infection for linkage to additional care and treatment services. All sites used a rapid HCV testing form developed by the DPH Hepatitis Epidemiology Unit to collect demographic and risk factor information on all patients who were tested. These data were shared with the DPH Hepatitis Epidemiology Unit for analysis and evaluation of the initiative.

Figure 7.4: Rapid HCV-antibody Test Sites, Georgia, 2015-2016

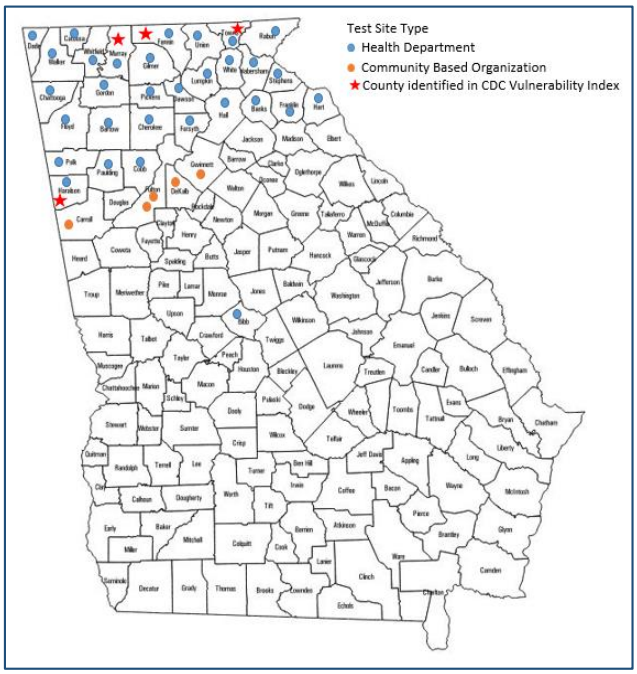
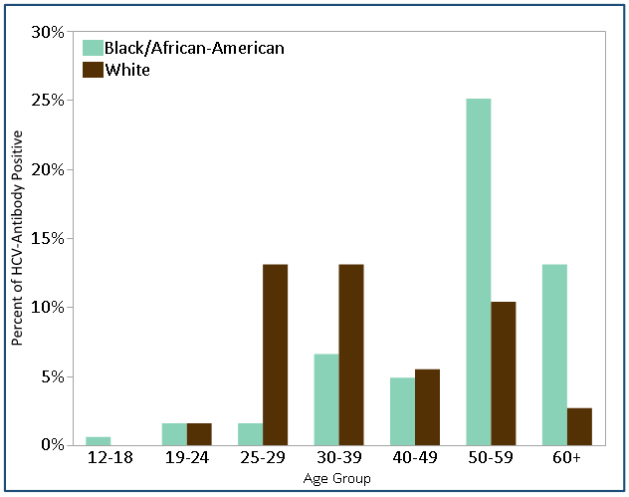


Figure 7.5: Rapid HCV-Antibody Testing Initiative, Positive Results by Race and Age Group, Georgia, 2015-2016



Overall, 3,315 people were tested under the Rapid HCV-Antibody Testing Initiative during 2015-2016, with a 6% positivity rate. Slightly more than half (56%) of those who tested positive reported male gender; 15% did not report any gender. Of concern is the growing number of HCV infections in young adults. While 36% of participants with positive HCV antibody results were between 50 and 59

years of age – not unexpected for baby boomers, 38% were under the age of 40. Of all who tested positive for hepatitis C, 53% were black or African American and 46% were white. (Table 7.1) However, of the positive patients between the ages of 12 and 39 years (n=70), 73% were white. In contrast, of the positive patients aged 40 and older (n=113), 70% were black or African American. (Figure 7.5)

Table 7.1: Demographic Characteristics of Clients in the Rapid HCV-Antibody Testing Initiative, by Test Result, Georgia, 2015-2016

	HCV Rapid Reactive (%)	Non-Reactive (%)	Indeterminate Result
Total Tested = 3,315	**185** (6)	**3,129** (94)	**1** (<1)
Age Group (years)			
0-11	0 (0)	0 (0)	0 (0)
12-18	1 (1)	114 (4)	0 (0)
19-24	6 (3)	594 (19)	0 (0)
25-29	27 (15)	574 (18)	1 (<1)
30-39	36 (19)	710 (23)	0 (0)
40-49	20 (11)	518 (17)	0 (0)
50-59	66 (36)	452 (14)	0 (0)
60+	29 (15)	156 (5)	0 (0)
Missing	0 (0)	11 (<1)	0 (0)
Gender			
Female	54 (29)	1,079 (34)	0 (0)
Male	103 (56)	1,838 (59)	1 (<1)
Transgender (FTM)	0 (0)	4 (<1)	0 (0)
Transgender (MTF)	0 (0)	16 (<1)	0 (0)
Missing	28 (15)	192 (6)	0 (0)
Race			
Asian	0 (0)	16 (<1)	0 (0)
Black or African-American	98 (53)	1,938 (62)	1 (<1)
Multiracial	0 (0)	14 (<1)	0 (0)
Native American or Alaskan Native	0 (0)	5 (<1)	0 (0)
Native Hawaiian or Pacific Islander	0 (0)	4 (<1)	0 (0)
Other	0 (0)	40 (1)	0 (0)
White	85 (46)	1,000 (32)	0 (0)
Decline to Answer	0 (0)	44 (1)	0 (0)
Missing	2 (1)	68 (2)	0 (0)
Ethnicity			
Hispanic or Latino	4 (2)	229 (7)	0 (0)
Non-Hispanic or Non-Latino	148 (80)	2,511 (80)	1 (<1)
Decline to Answer	0 (0)	56 (2)	0 (0)
Missing	33 (18)	333 (11)	0 (0)

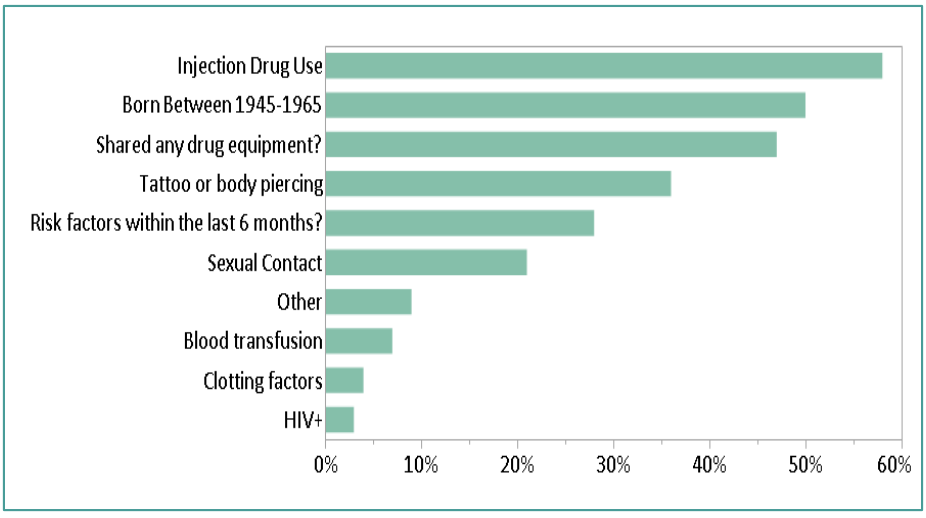
Further analysis based on the setting showed that health departments had a 5% hepatitis C positivity rate, while testing conducted by CBOs yielded a 6% positivity rate. As expected, testing conducted by Atlanta Harm Reduction Coalition, which targets substance users and injection drug users, resulted in a 15% hepatitis C positivity rate. Health department testing yielded the highest positivity rates in the North Georgia Health Districts: District 1-1 (5%), District 1-2 (10%), and District 2 (17%). These three districts include Appalachian populations. The Appalachian region in the U.S. has seen increasing rates of HCV due to the opioid epidemic. It is important to note that all sites began testing at different times, so the data shown are not comparable over the entire time period. (Table 7.2)

*Table 7.2: Rapid HCV-Antibody Test Results by Agency, Georgia, 2015-2016**

	Rapid HCV Antibody Tests Conducted	Positivity Rate
Community Based Organization	**2,233**	**6%**
AID Atlanta	178	1%
AID Gwinnett	76	1%
Atlanta Harm Reduction Coalition	512	15%
Positive Response, Inc.	307	5%
Someone Cares Inc. of Atlanta	1,160	3%
Health Department	**1,082**	**5%**
Northwest Health District 1-1	534	5%
North Georgia Health District 1-2	98	10%
North Health District 2	52	17%
Cobb/Douglas Public Health District 3-1	148	3%
Macon-Bibb County Health Department	250	2%
Cumulative Total	**3,315**	**6%**

**Note that sites conducted rapid HCV antibody testing for different lengths of time during this period.*

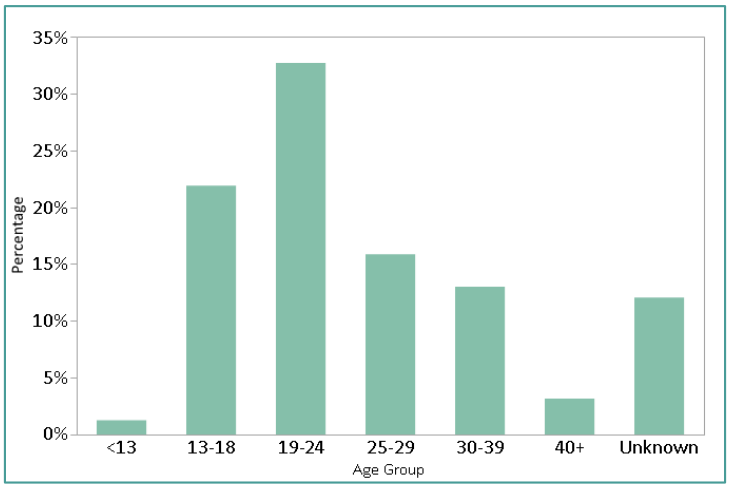
Figure 7.6: Percentage of Identified Risk Factors for Persons with a Rapid HCV Antibody Reactive Result, Georgia, 2015-2016



Looking more closely at the risk factor data collected and noting that categories were **not** mutually exclusive, more than half (58%) of those who tested positive for HCV antibody reported a current or past IDU history; 47% admitted to sharing drug equipment; and 50%

were baby boomers born between 1945 and 1965. Further, 28% had engaged in unspecified behaviors placing them at risk for HCV infection within the 6 months prior to being tested. (Figure 7.6)

Figure 7.7: Age at Initiation of Injection Drug Use, Reported at Time of Rapid HCV Antibody Testing, Georgia, 2015-2016



Looking further at the IDU behaviors among those who tested positive for HCV antibody, the data show that the majority of those with an IDU risk factor initiated IDU between the ages of 19 and 24 years (33%); 23% began this risky behavior by 18 years of age; and 29% began IDU between 25 and 40 years of age. (Figure 7.7)

Gilead FOCUS Partnerships in Georgia

In 2010, Gilead Sciences developed the Frontlines of Communities in the United States (FOCUS) program to share best practices in routine bloodborne virus screening, diagnosis, and linkage to care in accordance with CDC's recommended screening guidelines.

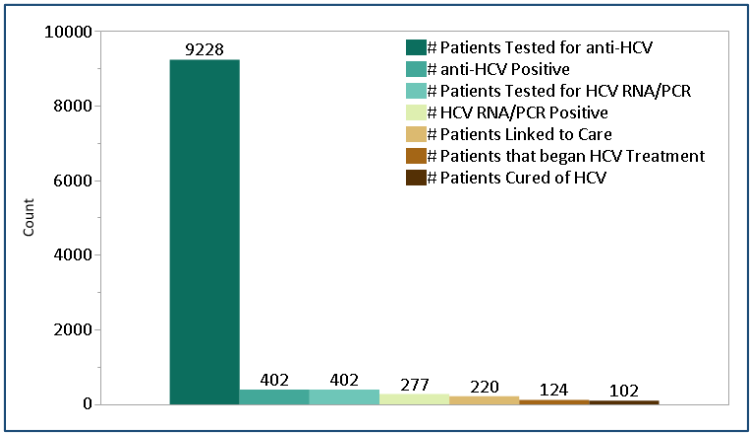
First launched to address HIV, this public health initiative expanded its scope in 2014 to integrate HCV screening and linkage to care. Further expansion in 2016 added HBV screening and linkage to care in select geographic areas. Together, the FOCUS partners have established a screening and linkage-to-care infrastructure to support individuals and public health. FOCUS partners utilize the Four Pillars of Routine Screening model, TEST (Testing integrated into normal clinical flow; Electronic medical record modification; Systematic policy change; and Training, feedback, and quality improvement), to identify people previously undiagnosed with HIV and HCV and support linkage to care.

Since 2010, FOCUS has partnered with more than 300 hospitals, community health centers, health departments, and other health care organizations to advance routine screening and diagnosis, connect patients to care, and inform local and national strategies to address bloodborne viruses. Below are highlights of the successes of five FOCUS partners in Georgia.

Curtis V. Cooper Primary Health Care, Inc.

Curtis V. Cooper Primary Health Care, Inc. (CVCPHC) is a Federally Qualified Health Center (FQHC) that provides primary care and preventative health services to the Savannah-Chatham County area. CVCPHC became a FOCUS partner in January 2016 and conducts routine HCV screening at seven locations throughout Savannah for adults 18 to 64 years of age. It is estimated that CVCPHC could serve 16,105 patients in this target population. Approximately 85% of CVCPHC's patients are treated for HCV on site, and 15% are referred to gastroenterology practices due to insurance requirements. Figure 7.8 shows that since January 2016, CVCPHC has tested 9,228 people, with 402 (4.4%) being positive for HCV antibody. Of those with a positive HCV antibody, 277 (69%) had a confirmed HCV infection (testing positive for HCV RNA/PCR). Of the 220 patients linked to care, 124 began HCV treatment and 102 (82%) were successfully treated and cured. It should be noted that CVCPHC did provide on-site treatment for HCV patients prior to spring 2016.

Figure 7.8: Curtis V. Cooper Primary Health Care, Inc. FOCUS Results, January 2016-July 2017



Note: FOCUS funding does not support any activities beyond the first linkage to care appointment and do not monitor how FOCUS partners handle subsequent patient care and treatment.

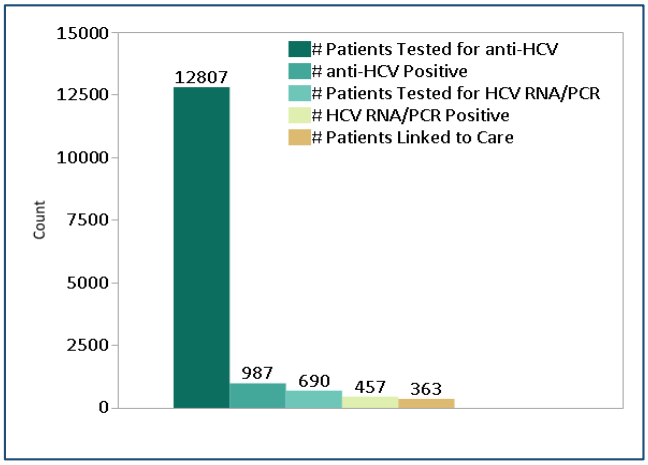
Emory University, Grady Health System

Grady Health System, located in Atlanta, Georgia, is a safety net hospital providing care to indigent, uninsured, and underinsured patients in the metro Atlanta area. The Grady Liver Clinic was established in 2002 as a primary care-based clinic, providing comprehensive HCV care and treatment for uninsured patients. The Liver Clinic operates twice a week through the Primary Care Center at Grady Hospital. From 2012 to2015, the Liver Clinic began a screening program targeting baby boomers (those born between 1945 and 1965). Additional details about this screening program can be found on page 45.

Grady Health System became a FOCUS partner in 2013 and incorporated HCV screening in October 2015, operating in 13 locations which include primary care centers and neighborhood health centers throughout Atlanta. As a FOCUS partner, HCV screening is targeted toward baby boomers as well as those at risk for HCV per CDC recommendations. Treatment is provided on site at the Grady Liver Clinic.

Between October 2015 and June 2017, 12,807 patients were screened for HCV antibody, of which 987 (7.7%) tested positive. Of those, 690 patients were tested for HCV RNA/PCR, with 457 (66%) confirmed to be currently infected with HCV. Of those with a confirmed HCV infection, 363 patients (79%) were linked to care. Note that Grady does not formally collect treatment and outcome data; therefore, it is unknown how many of these patients began and were successfully treated for HCV. (Figure 7.9)

*Figure 7.9: Grady Health System FOCUS Results, October 2015 to June 2017**



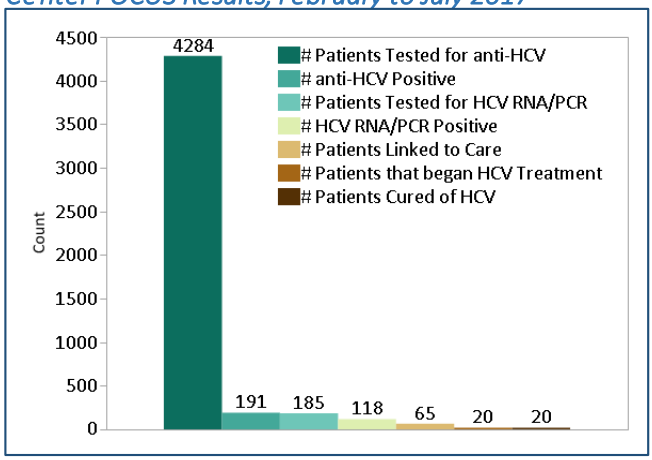
*Grady Health System does not formally collect data from patients that started HCV treatment and their clinical outcomes. Therefore, these data are not included in the analysis.

Note: FOCUS funding does not support any activities beyond the first linkage to care appointment and do not monitor how FOCUS partners handle subsequent patient care and treatment.

Memorial Health University Medical Center

Memorial Health University Medical Center (MHUMC), located in Savannah, Georgia, provides services to a 35-county area in southeast Georgia. MHUMC became a FOCUS partner in September 2016 and incorporated HCV screening in February 2017. MHUMC targets HCV screening for baby boomers in the emergency room and estimates that they see approximately 20,000 patients each year in this target population. HCV treatment services are provided on site at the Memorial Health Family Medicine Practice for both insured and uninsured patients. Approximately half of the patients screening positive for hepatitis C choose the option of onsite HCV care and treatment. Other uninsured and non-homeless patients are referred to St. Mary's Health Center, also located in Savannah. Patients are also referred to either the MHUMC

Figure 7.10: Memorial Health University Medical Center FOCUS Results, February to July 2017



Note: FOCUS funding does not support any activities beyond the first linkage to care appointment and do not monitor how FOCUS partners handle subsequent patient care and treatment.

Family Medicine, MHUMC Internal Medicine, or Curtis V. Cooper Primary Health Center. Those patients with private insurance or Medicaid and who are well-established with a primary care physician, are referred to the Center for Digestive Care and Liver Health in Savannah.

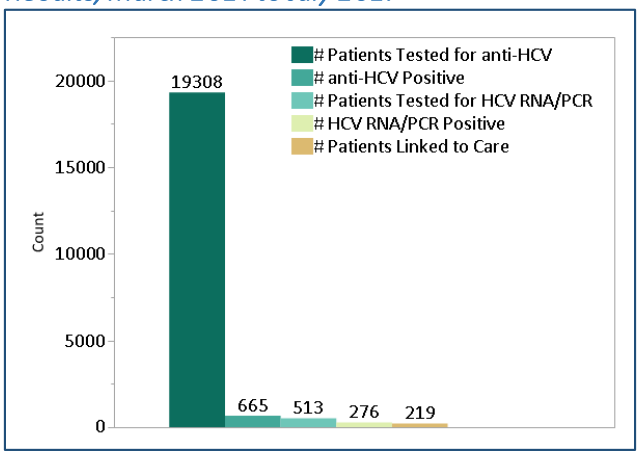
Since February 2017, MHUMC has tested 2,658 patients, 170 (6.3%) of whom tested positive for HCV antibody. HCV RNA/PCR testing was provided for 164 (96%) of them; 102 (62%) were confirmed with HCV infection, and 72 were linked to care and began HCV treatment. As of August 2017, 20 patients (28%) have successfully completed HCV treatment. (Figure 7.10)

Southside Medical Center

Southside Medical Center (SMC) is a FQHC that provides services at multiple locations in Atlanta and surrounding areas. SMC became a FOCUS partner offering HIV testing in June 2012 and integrated HCV screening in March 2014. Universal HCV screening was implemented for all those 18 years of age and older at 10 locations throughout Atlanta and cities surrounding Atlanta. SMC currently serves 18,794 people in this target population. SMC provides HCV treatment at their main center in Atlanta. All patients are first referred to their main center for a Fibroscan®. Uninsured patients are referred to other facilities for the initial lab tests. Once those initial lab results are obtained, most patients do return to SMC for treatment.

Since March 2014, SMC has tested a total of 19,308 patients, 665 (3%) of whom tested positive for HCV antibody. Of the 513 who were tested for HCV RNA/PCR, 276 (54%) were confirmed with HCV infection; 219 (79%) were linked to care. (Figure 7.11)

*Figure 7.11: Southside Medical Center FOCUS Results, March 2014 to July 2017**

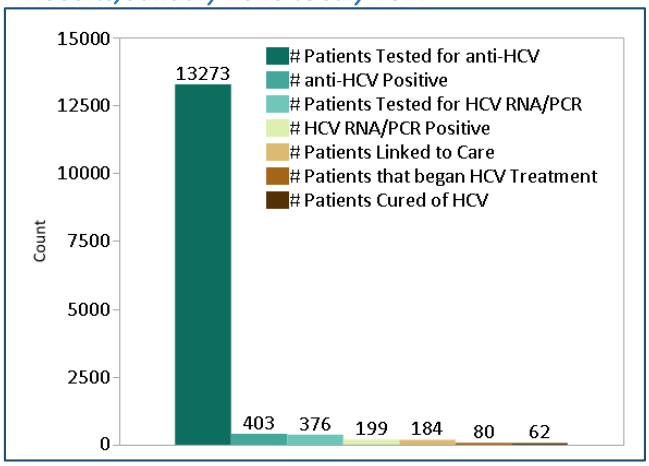


*Treatment was first offered in-house in January 2016. See Figure 9.11 for treatment results.

Note: FOCUS funding does not support any activities beyond the first linkage to care appointment do not monitor how FOCUS partners handle subsequent patient care and treatment.

SMC integrated HCV treatment as part of their routine services in January 2016. Since January 2016, a total of 13,273 patients have been screened for HCV, of whom 403 (3%) were found to be HCV antibody positive. Of 376 patients tested for HCV RNA/PCR, 199 (53%) were confirmed with a current HCV infection. Of 184 patients (92%) who were linked to care, 80 (43%) began HCV treatment. As of July 2017, 62 patients (78%) successfully completed HCV treatment. (Figure 7.12)

Figure 7.12: Southside Medical Center FOCUS Results, January 2016 to July 2017

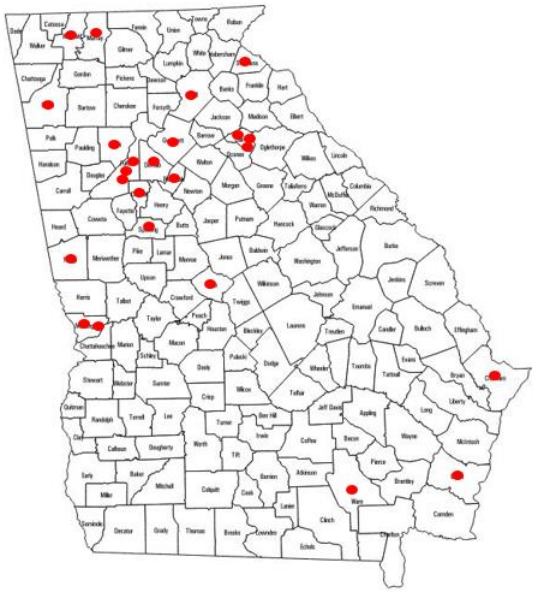


Note: FOCUS funding does not support any activities beyond the first linkage to care appointment and do not monitor how FOCUS partners handle subsequent patient care and treatment.

Imagine Hope, Inc.

Imagine Hope, located in Atlanta, is a contract agency with the Georgia Department of Behavioral Health and Developmental Disabilities (DBHDD), Office of Addictive Diseases, which provides project management, training, and technical assistance for HIV counseling and testing services to nurses and counselors in substance abuse treatment centers statewide. In April 2015, Imagine Hope, Inc. became a FOCUS partner by integrating HCV screening and linkage to care services at five substance abuse and medically assisted treatment centers in the metro Atlanta area. By March 2017, Imagine Hope, Inc. expanded to 24 sites throughout Georgia. (Figure 7.13) HCV screening at these sites is targeted toward individuals with a substance abuse diagnosis, including injection drug use. All 24 sites provide both HCV antibody and HCV RNA/PCR testing to their clients. In addition, linkage to care coordination is conducted to ensure that clients with confirmed HCV infection are linked to care

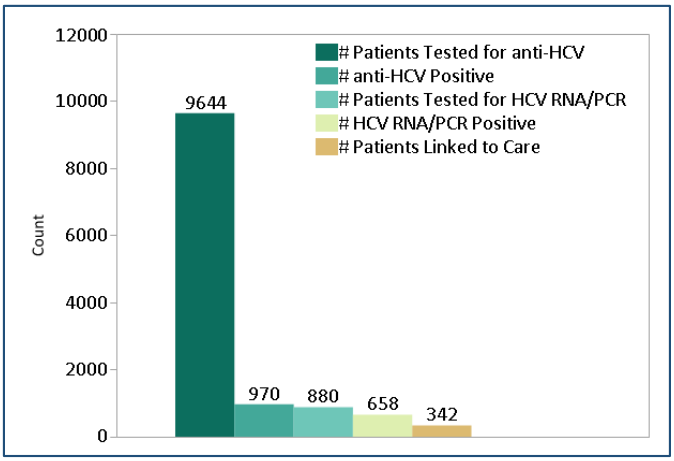
Figure 7.13: Locations for Imagine Hope, Inc. HCV Testing Sites



and treatment services. Imagine Hope, Inc. plans to expand services to two additional sites by the end of 2017.

Between April 2015 and June 2017, the 24 sites tested 9,515 clients for HCV antibody, yielding an 11% positivity rate (1,053 people). Of those, 860 clients were tested for HCV RNA/PCR, with 637 (74%) confirmed as currently infected with HCV. Of those confirmed with HCV infection, 272 (43%) were linked to care. It should be noted that HCV treatment and outcome data were not yet available at the time of this report; therefore, it is unknown how many of these clients began and successfully completed HCV treatment. (Figure 7.14)

*Figure 7.14: Imagine Hope FOCUS Results, April 2015 to March 2017**



*HCV treatment and outcome data were not yet available to include in this Epidemiologic Profile, so were not included in the analysis.

Note: FOCUS funding does not support any activities beyond the first linkage to care appointment and do not monitor how FOCUS partners handle subsequent patient care and treatment.

Internal Medicine Trainees Identifying and Linking to Treatment for Hepatitis C (TILT-C)

Through CDC funding, Emory University's School of Medicine and the Rollins School of Public Health implemented a HCV screening program (TILT-C) at Grady Memorial Hospital's Primary Care Center and the Grady Liver Clinic, in Atlanta, Georgia during 2012-2014.

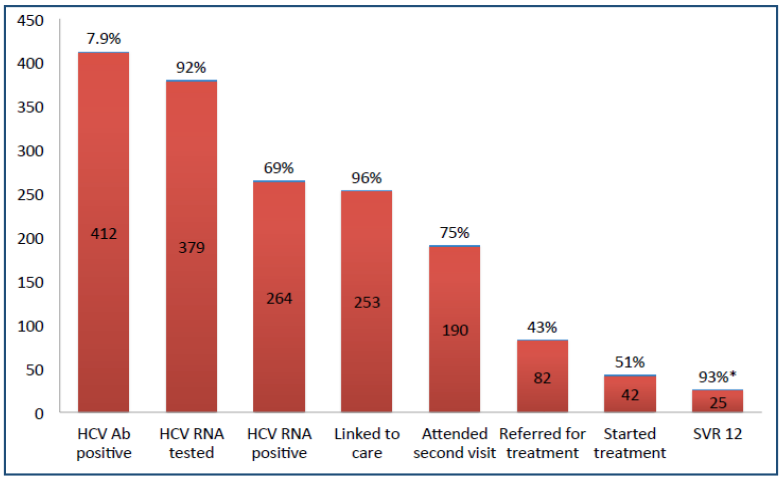
TILT-C mobilized internal medicine residents from Emory University and Morehouse School of Medicine to improve identification of patients infected with HCV and increase linkages to care and treatment services. Grady Primary Care Center patients born between 1945 and 1965 (baby boomers) were routinely screened for HCV, and those confirmed with HCV infection were referred to care at the Morehouse Infectious Disease Clinic or to Grady Liver Clinic, a primary care based hepatitis C clinic that provides care which includes HCV antiviral therapy for uninsured patients.

Table 7.3: Demographic Characteristics of TILT-C Patients. 2012-2014

Characteristic	Count (%)
Anti-HCV (+) Patients	412
Mean age	60 yrs
Gender	
Male	245 (60)
Race	
Black	386 (94)
White	22 (5)
Other	4 (1)
Insurance Status	
None	313 (76)
Public	94 (23)
Private	5 (1)

Through this screening program, 5,239 patients were tested for HCV antibody, yielding an 8% positivity rate. Of the 412 that tested positive for HCV antibody, 60% were male, 94% were black, and 76% were uninsured. The average age of those testing HCV antibody positive was 60 years. (Table 7.3)

Figure 7.15: HCV Care Cascade for Patients Tested through TILT-C at Grady Memorial Hospital, 2012-2014



*Of 27 patients who had SVR12 lab results available

Twenty months after the completion of TILT-C, charts were reviewed for all 412 HCV antibody positive patients. Ninety-two percent of those with positive HCV antibody results were tested for HCV RNA; 69% of them were confirmed to have current HCV infection. Of this group, 96% were linked to care. Of 82 patients who were referred for treatment, 51% began HCV treatment and 93% of those with data available achieved a sustained virologic response 12 weeks post-treatment. (Figure 7.15)

Of those patients who were linked to care, 49% were referred by the Primary Care Center; 46% were referred to care by the Liver Clinic; and 5% were referred by the Infectious Disease Clinic. (Figure 7.16) Reasons for why patients did not begin HCV treatment varied. The majority (30%) were not treated due to minimal fibrosis and 29% were lost to follow-up; 8% were not treated due to ongoing substance abuse, and 13% chose to await the availability of new HCV treatment options. (Figure 7.17)

Figure 7.16: Linkage by Specialty, TILT-C, 2012-2014

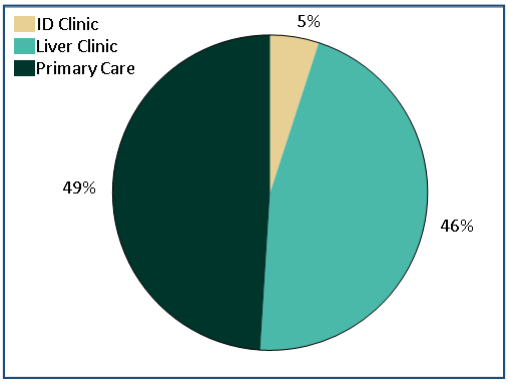
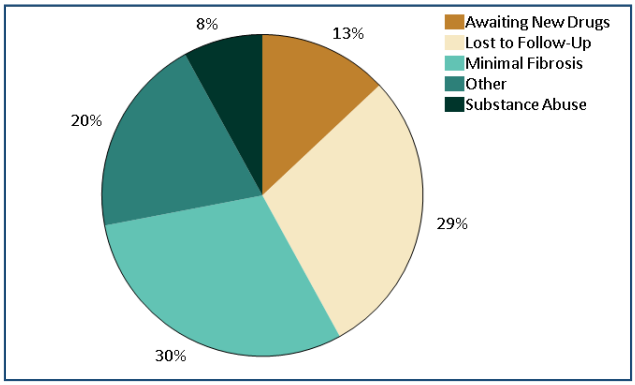


Figure 7.17: Reason for Non-Treatment, TILT-C, 2012-2014



Medicaid Claims for Viral Hepatitis Testing

To further assess viral hepatitis testing trends in Georgia, aggregate Medicaid claims data were obtained from the Georgia Department of Community Health (DCH). Data were obtained from both testing and vaccination claims for 2015 and 2016 based on ICD-9 and ICD-10 diagnostic and Current Procedural Terminology (CPT) codes. Unique patient identification numbers were extracted from the total number of Medicaid observations to determine the number of patients tested and subsequently diagnosed with HBV and HCV infection.

There were 181,571 claims related to HBV screening for 66,236 patients between 2015 and 2016 in Georgia. More than half of those tested (53.6%) were between the ages of 15 and 34 years. Although the reason for screening in this age group is unknown based on the data collected, it can be surmised that patients between 15 and 34 years of age may have been tested to assess immunity or susceptibility to HBV, if vaccination history was unknown. Although separate categories are listed for "carrier" and "chronic" hepatitis B infections, the corresponding ICD-10 codes both designate chronic HBV infection. It should also be noted that some of the 102 cases designated as "acute" may not have been truly acute (new) HBV infections, according to CSTE/CDC case definitions, but rather parts of rule-out diagnoses. Due to the nature of aggregate billing data, it is impossible to match them with actual reported cases in SendSS. Nearly 58% of those tested for HBV were black or African American (which may include refugee screening); 24% were white; 5% were Asian or Pacific Islander; and less than 1% reported Hispanic or Latino ethnicity. Of the 702 HBV diagnostic codes claimed with Medicaid, nearly 83% had carrier/chronic HBV diagnoses; 14% had acute HBV diagnoses; and nearly 3% had chronic HBV diagnoses with the delta agent or hepatitis D coinfection. (Table 7.4)

From 2015 to 2016, there were 152,519 claims for HCV testing, for a total of 75,337 patients. Of those, 36% were baby boomers and 37% were ages 30 years or younger. The largest percentages of those tested for HCV were in age groups between 55 and 64 years (22.4%) and between 25 and 34 years (21.6%). Nearly half of all Medicaid patients tested for HCV were black or African American whereas 25% were white. More than half (54%) of those ages 30 years and younger and 45% of baby boomers tested for HCV were black or African American. In contrast, 34% of those ages 30 years and younger were white, compared to 15% of the baby boomers tested for HCV. Similar to hepatitis B, separate categories are listed for "carrier" and "chronic" hepatitis C infections, but both corresponding diagnostic codes designate chronic HCV infection. Overall, 70% of those tested were diagnosed with either acute or chronic HCV infection, including 59% of those ages 30 years and younger and 71% of baby boomers. (Table 7.5)

Table 7.4: Medicaid Claims Data for Hepatitis B Services, Georgia, 2015-2016

	Count	Percentage
HBV Claims	181,571	---
HBV Patients	66,236	---
Age Group (years)		
< 15	2,902	4.4%
15-24	17,835	26.9%
25-34	17,698	26.7%
35-44	8,340	12.6%
45-54	6,831	10.3%
55-64	7,092	10.7%
65-74	3,489	5.3%
75-84	1,638	2.5%
85+	343	0.5%
Missing	68	0.1%
Race/Ethnicity		
American Indian/Alaskan Native	86	0.1%
Asian or Pacific Islander	3,176	4.8%
Black or African American	38,348	57.9%
Hispanic	359	0.5%
Other	380	0.6%
Unknown	8,029	12.1%
White (Non-Hispanic)	15,858	23.9%
HBV Diagnosis		
Carrier[a]	54	7.7%
Acute[b]	102	14.5%
Chronic[c]	527	75.1%
Chronic with delta agent[d]	19	2.7%
Total Procedures		
anti-HBs[e]	23,965	28.2%
HBsAg[f]	59,587	70.1%
HBV DNA or RNA[g]	1,455	1.7%

[a] Carrier HBV diagnosis based on diagnostic code Z22.51.
[b] Acute HBV diagnosis based on diagnostic code B16.9.
[c] Chronic HBV diagnosis based on diagnostic code B18.1.
[d] Chronic HBV with delta agent diagnosis based on diagnostic code B18.0.
[e] HBV surface antibody tests based on CPT code 86706.
[f] HBV surface antigen tests based on CPT codes 87340 and 87341.
[g] HBV infection agent DNA or RNA tests based on CPT codes 87515, 87516, and 87517.

Table 7.5: Medicaid Claims Data for Hepatitis C Services, Georgia, 2015-2016

	Total	≤ 30 years of Age	Baby Boomers*
	Count (%)	Count (%)	Count (%)
HCV Claims	152,519 (---)	31,852 (20.9)	82,156 (53.9)
HCV Patients	75,337 (---)	27,622 (36.7)	26,813 (35.6)
Age Group (years)			
< 15	2,470 (0.2)	---	---
15-24	14,500 (19.3)	---	---
25-34	16,272 (21.6)	---	---
35-44	9,003 (11.9)	---	---
45-54	11,394 (15.1)	---	---
55-64	16,903 (22.4)	---	---
65-74	3,858 (22.4)	---	---
75-84	723 (0.9)	---	---
85+	109 (0.1)	---	---
Missing	105 (0.1)	---	---
Race			
American Indian/Alaskan Native	138 (0.2)	44 (0.2)	61 (0.2)
Asian or Pacific Islander	2,582 (3.4)	957 (3.5)	368 (1.4)
Black or African American	37,402 (49.7)	14,770 (53.5)	11,938 (44.5)
Hispanic	434 (0.6)	177 (0.6)	161 (0.6)
Other	415 (0.6)	324 (1.2)	19 (0.1)
Unknown	15,670 (20.1)	1,911 (6.9)	10,248 (38.2)
White (Non-Hispanic)	18,696 (24.8)	9,439 (34.2)	4,018 (15.0)
HCV Diagnosis			
Carrier[a]	471 (1.7)	56 (4.5)	321 (1.6)
Unspecified[b]	8,191 (30.2)	504 (40.6)	5,936 (29.5)
Acute[c]	1,821 (6.7)	135 (10.9)	1,238 (6.1)
Chronic[d]	16,603 (61.3)	547 (44)	12,658 (62.8)
Total Procedures			
Acute Hepatitis Panel[e]	---	---	---
HCV-antibody[f]	50,630 (75.1)	26,011 (93.2)	9,066 (44.9)
HCV Viral Load[g]	13,217 (19.6)	1,616 (5.8)	8,686 (43)
HCV Genotype[h]	3,556 (5.3)	269 (1.0)	2,443 (12.1)

* Baby Boomers represent patients born between 1945 and 1965. This variable was calculated based on age and year of test.
[a] Carrier HCV diagnosis based on diagnostic codes V0262 and Z2252.
[b] Unspecified HCV diagnosis based on diagnostic codes 070.70, B19.20 and B17.9.
[c] Acute HCV diagnosis based on diagnostic codes 070.51 and B17.10.
[d] Chronic HCV diagnosis based on diagnostic codes 070.54 and B18.2.
[e] Acute hepatitis panel tests based on CPT code 80074. No acute hepatitis tests recorded during a client's first or last visits.
[f] HCV-antibody tests based on CPT codes 86803 and 86804.
[g] HCV viral load tests based on CPT codes 87520, 87521, and 87522.
[h] HCV genotype tests based on CPT codes 87902 and 3266F.

References:

[21] Van Handel MM, Rose CE, Hallisey EJ, et. al. County-Level Vulnerability Assessment for Rapid Dissemination of HIV or HCV Infections Among Persons Who Inject Drugs, United States. J Acquir Immune Defic Syndr. 2016 Nov 1;73(3): 323-331External

Substance Abuse and the Opioid Epidemic

Injection drug use is a growing problem in the United States, with national survey data revealing an increase in first-time heroin use.[22] An estimated 2.4 million Americans have experienced substance use disorders related to prescription opioids.[23] Recent studies have shown a transition from the nonmedical use of prescription opioids to injected heroin that can be attributed to the development of tolerance to prescription opioids, lower heroin costs, increased heroin potency, simplicity of heroin injection, and stigma against prescription opioid injection.[24] Persons who use, abuse, and/or depend on illicit drugs often engage in behaviors that increase the risk for acquiring or transmitting infectious diseases, including viral hepatitis. In fact, viral hepatitis rates are significantly higher among persons who use illicit drugs in comparison to persons who do not use illicit drugs.[25]

To reduce the risk of transmitting bloodborne infections among persons who inject drugs, several states have legalized community-based public health syringe services programs (SSPs). SSPs offer comprehensive harm reduction services, including sterile injection equipment, safe disposal containers, HIV/viral hepatitis testing, HIV/viral hepatitis treatment linkage, overdose/infectious disease prevention education, substance use disorder treatment referrals, and/or vaccinations. In addition to lowering new HIV and viral hepatitis infections and saving healthcare costs for the treatment of those diseases, these programs have also proven to be effective in decreasing needle stick injuries among first responders; increasing entries into substance use disorder treatment centers; and reducing overdose deaths.[26]

Currently, there are no Georgia laws that authorize the establishment of SSPs. Georgia law, *Title 16. Crimes and Offenses; Chapter 13. Controlled Substances Article 2. Regulation of Controlled Substances; § 16-13-32 (Transaction in drug related object)* states that it is unlawful for any person or corporation to sell or distribute drug-related objects. This code only allows for pharmacists, pharmacy interns or externs, or practitioners licensed to dispense dangerous drugs to distribute hypodermic needles or syringes. Further, Georgia law, *Title 16. Crimes and Offenses; Chapter 13. Controlled Substances Article 2. Regulation of Controlled Substances; § 16-13-32 (Possession and use of drug related objects)* states that it shall be unlawful for any person to use, or possess, objects or materials for the intent of introducing into the human body marijuana or a controlled substance.

Nationally, the rise in prescription and illicit drug abuse parallels drug overdoses. Overdose deaths, hospitalizations, and emergency department (ED) visits from both prescription and illicit drugs in the United States have been increasing since the 1990s, leading to a national drug overdose epidemic.[27] The South US Census region, which includes Georgia, had the highest annual drug overdose death rate for natural/semi-synthetic opioids and prescription opioids in both 2014 and 2015, slightly increasing from one year to the next. Furthermore, national age-adjusted rates of drug overdose deaths from 2010-2015 showed Georgia as one of 30 states

with significant increases.[27] These occurrences amplify the potential for increased viral hepatitis incidence and subsequent burden on Georgia's healthcare system.

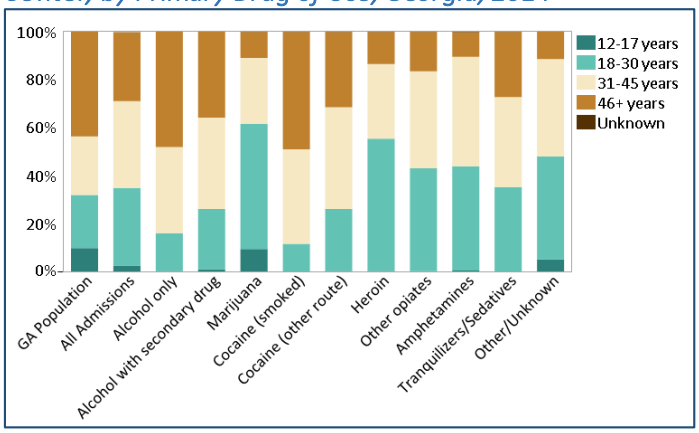
Treatment Episode Data Set (TEDS)

The better assess the burden of substance abuse and the opioid epidemic in Georgia, data from TEDS from 2014-2015 was obtained and analyzed from the Substance Abuse and Mental Health Services Administration (SAMSHA), Center for Behavioral Health Statistics and Quality. TEDS includes data that are collected to monitor substance abuse treatment facilities. Those facilities reporting data in TEDS are those that receive funding from the state alcohol and/or drug agency.

TEDS data can offer insight on drug use trends in Georgia; however, there are many limitations to this data, which are listed in Table 8.1. It should also be noted that data obtained from TEDS may include non-Georgia residents.

Nationally, between 2006-2012, there was an increase in confirmed acute HCV infections among young persons (≤30 years of age) from nonurban areas, of which approximately 73% cited injection drug use as a primary risk factor.[22] Data from Drug treatment centers in Georgia during 2014 showed that patients 12 to 30 years of age represented 35% (n=14,468) of all admissions; those 31 to 45 years of age represented 36% (n=14,882); and patients 45 years of age or older represented 29% (n=11,988) of the total admissions for any drug type that year (Figure 8.1). Although persons aged 12 to 30 made up only 32% of Georgia's entire population in 2014, this age group constituted 35% of admissions due to tranquilizers/sedatives, 43% due to other opiates, 44% due to amphetamines, 55% due to heroin, and 62% due to marijuana admissions to drug treatment centers in Georgia that year. Furthermore, persons aged 31 to 45 made up 24% of Georgia's entire population in 2014, yet comprised 31% of heroin, 37% of tranquilizers/sedatives, 40% of other opiates, and 46% of amphetamine admissions in the state that year. Persons older than 45 made up the largest age group proportion (44%) of Georgia's population in 2014, while also comprising the majority of drug center admissions due to alcohol only (48%) and 49 % of those due to smoked cocaine.. Georgia patients older than 45 had lower admission percentages for

Figure 8.1: Age at Time of Admission to Drug Treatment Center, by Primary Drug of Use, Georgia, 2014



Source: SAMSHA, Center for Behavioral Health Statistics and Quality, TEDS. Accessed from: https://wwwdasis.samhsa.gov/webt/information.htm

Note: Age was unknown for 41 patients.

marijuana, heroin, other opiates, amphetamines, and tranquilizers/sedatives compared to patients aged 12 to 30 and aged 31 to 45 years of age during 2014.

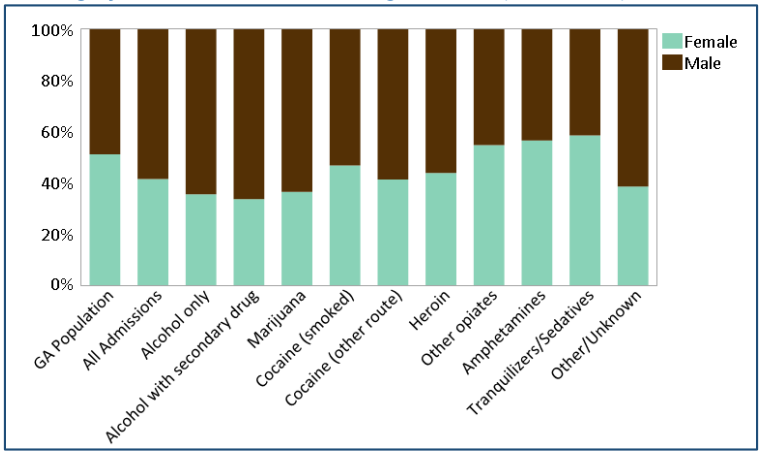
Table 8.1: Limitations to Treatment Episode Data Set (TEDS) Data

TEDS is an exceptionally large and powerful dataset. Like all datasets, however, care must be taken that interpretation does not extend beyond the limitations of the data. Limitations fall into two broad categories: those related to the scope of the data collection system, and those related to the difficulties of aggregating data from the highly diverse State data collection systems. Limitations to be kept in mind while analyzing TEDS data include:
• TEDS is an admission-based system, and TEDS admissions do not represent individuals. An individual admitted to treatment twice within a calendar year would be counted as two admissions. Most States cannot, for reasons of confidentiality, identify clients with a unique ID assigned at the State level. Consequently TEDS is unable to follow individual clients through a sequence of treatment episodes.
• TEDS attempts to enumerate treatment episodes by distinguishing the initial admission of a client from his/her subsequent transfer to a different service type (for example, from residential treatment to outpatient) within a single continuous treatment episode. However, States differ greatly in their ability to identify transfers; some can distinguish transfers within providers but not across providers. Some admission records may in fact represent transfers, and therefore the number of admissions reported probably overestimates the number of treatment episodes.
• The number and client mix of TEDS admissions does not represent the total national demand for substance abuse treatment, nor the prevalence of substance abuse in the general population.
• The primary, secondary, and tertiary substances of abuse reported to TEDS are those substances which led to the treatment episode, and not necessarily a complete enumeration of all drugs used at the time of admission.
• In reporting TEDS data, SAMHSA must balance timeliness of reporting with completeness of the data set. States rely on individual facilities to report in a timely manner. States then bundle the data and report them to SAMHSA at regular intervals. Admissions from facilities that report late to the States may appear in a later data submission to SAMHSA. However, the additional submissions are unlikely to have a significant effect on the percentage distributions that are the basis of these tables.
• States continually review the quality of their data processing. When systematic errors are identified, States may revise or replace historical TEDS data files. TEDS continues to accept data revisions for admissions occurring in the previous five years. While this process represents an improvement in the data, the numbers of admissions reported here may differ slightly from those in earlier or subsequent reports and tables.
Considerations specific to these tables include:
• The tables are based on administrative data reported by States to TEDS through Apr 03, 2015.
• The tables focus on treatment admissions for substance abusers. Thus admissions for treatment as a codependent of a substance abuser are excluded. Records for identifiable transfers within a single treatment episode are also excluded.
• Records with partially complete data have been retained. Where records include missing or invalid data for a specific variable, that record is excluded from tabulations of that variable. The total number of admissions on which a percentage distribution is based is reported in each table.
• Primary alcohol admissions are characterized as Alcohol only or Alcohol with secondary drug. Alcohol with secondary drug indicates a primary alcohol admission with a specified secondary or tertiary drug. All other alcohol admissions are classified as Alcohol only.
• Cocaine admissions are classified according to route of administration as Smoked and Other route. Smoked cocaine primarily represents crack or rock cocaine, but can also include cocaine hydrochloride (powder cocaine) when it is free-based. Non-smoked cocaine includes cocaine admissions where the route of administration is not reported, and thus the TEDS estimate of the proportion of admissions for smoked cocaine is conservative.
• Methamphetamine/amphetamine admissions include admissions for both methamphetamine and amphetamine, but are primarily for methamphetamine. Two States (Oregon and Arizona) do not distinguish between methamphetamine and amphetamine admissions. However, for the States that make this distinction, methamphetamine constitutes about 95 percent of combined methamphetamine/amphetamine admissions.

Source: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality, Treatment Episode Data Set (TEDS). Accessed from: https://wwwdasis.samhsa.gov/webt/information.htm

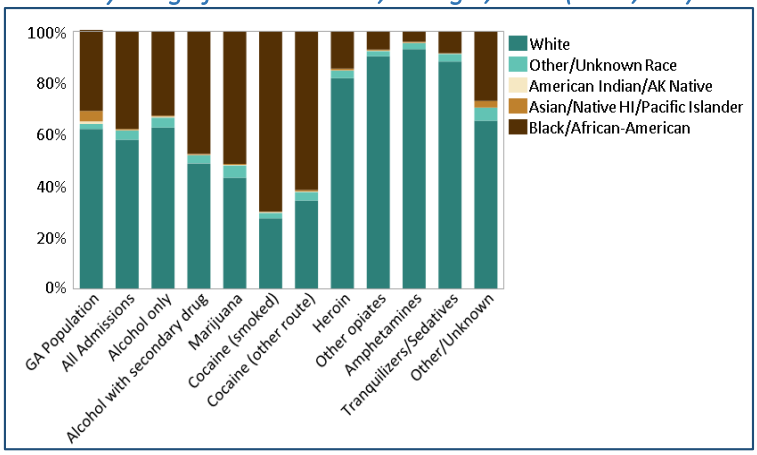
The national estimated rate of persons aged 12 years or older that used illicit drugs or misused prescription drugs in 2015 was higher among males (20.5/100 population) than females (15.3/100 population). In contrast, national prescribing rates for opioids in 2016 was higher for females (21.8/100 population) than males (16.4/100 population).[27] In Georgia, drug treatment center admissions in 2014 for any drug type were higher among males (58%) than females (42%) (Figure 8.2). When analyzing by drug type, the majority of these admissions were predominately among males, with the exception of those due to other opiates (55% female), amphetamines (57% female), and tranquilizers/sedatives (59% female).

Figure 8.2: Admissions to Drug Treatment Center, by Primary Drug of Use and Gender, Georgia, 2014 (n=41,338)



Source: SAMSHA, Center for Behavioral Health Statistics and Quality, TEDS. Accessed from: https://wwwdasis.samhsa.gov/webt/information.htm

Figure 8.3: Admissions to Drug Treatment Center, by Primary Drug of Use and Race, Georgia, 2014 (n=41,338)

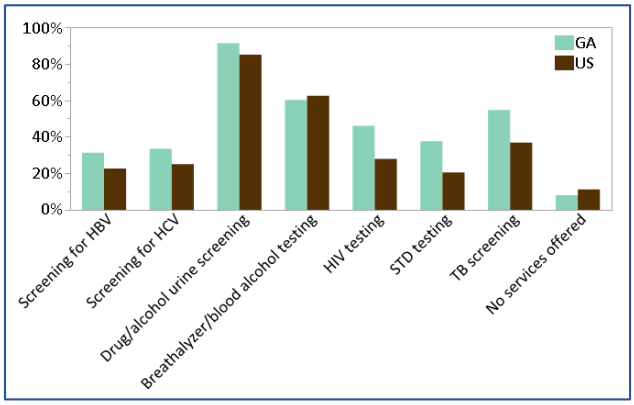


Source: SAMSHA, Center for Behavioral Health Statistics and Quality, TEDS. Accessed from: https://wwwdasis.samhsa.gov/webt/information.htm

National data from 2015 for illicit drug use and prescription drug misuse of persons aged 12 years or older showed the highest rate among non-Hispanic black/African-Americans (20.7/100 population), followed-by non-Hispanic whites (17.9/100 population), and Hispanics (17.2/100 population).[27] Georgia drug treatment center data from 2014 did not include ethnicity, however, 58% of all admissions were among whites and 38% were among black/African-Americans for any drug type (Figure 8.3). Among whites, almost all admissions in 2014 were due to heroin use (82%), tranquilizers/sedatives (88%), other opiates (90%), and amphetamines (93%). In contrast, black/African-Americans did comprise the majority of Georgia's drug treatment center admissions for marijuana (52%), other routes of cocaine (62%), and smoked cocaine (70%) in 2014.

In addition to substance abuse treatment, these facilities also provide other testing serivces to their patients. A higher percentage of drug treatment centers in Georgia offered testing services compared to the US in 2015, with the exception of breathalyzer/blood alcohol testing (Figure 8.4). This included a higher state percentage for HBV screening (31% GA; 23% US), HCV screening (34% GA; 25% US), and HIV testing (46% GA; 28% US). There was, however, a larger gap between Georgia facilities that offered HIV testing and HBV/HCV screening compared to these facilities nationally.

Figure 8.4: Percentage of Drug Treatment Facilities Offering Testing Services by Test Type, Georgia and US*, 2015*



*Georgia count=1,168; US count=40,532
Source: SAMSHA, Center for Behavioral Health Statistics and Quality, TEDS. Accessed from: https://wwwdasis.samhsa.gov/webt/information.htm

Georgia DPH Drug Overdose Surveillance

In addition to the drug treatment center data compiled from TEDS, data were obtained from the Georgia DPH Drug Overdose Surveillance Unit (https://dph.georgia.gov/drug-overdose-surveillance-unit) to describe fatal (mortality) and nonfatal (morbidity) opioid-involved overdoses, including prescription opioids, and illicit opioids such as heroin and synthetic opioids (e.g., fentanyl and fentanyl analogs), which occurred in Georgia during 2016. Opioid overdose data were analyzed by the Georgia Department of Public Health (DPH) Epidemiology Section, using Georgia hospital discharge inpatient and emergency department (ED) visit data, and DPH Vital Records death data. Case definitions for this mortality and morbidity data can be found in Table 8.2 and Table 8.3, respectively. Data shared below was adapted from the 2016 Georgia Opioid Overdose Surveillance Preliminary Report. The entirety of the report can be found at: https://dph.georgia.gov/sites/dph.georgia.gov/files/OPIOID%20OVERDOSE%20SURVEILLANCE.Georgia.2016.pdf

Table 8.2: Fatal Overdoses (Mortality) Case Definitions, Georgia, 2016

Data Source
Overdose-related deaths were derived from DPH Vital Records death certificates for all deaths that occurred in Georgia during 2016
Case Definitions (Note: categories are not mutually exclusive, includes only drug overdose deaths caused by acute poisoning)
Any drug overdose death *May involve any over-the-counter, prescription, or illicit drug* • Deaths with any of the following ICD-10 codes as any underlying cause of death: X40-44, X60-64, X85, Y10-14
Drug overdose death involving any opioid *Involves both prescription opioid pain relievers (e.g., hydrocodone, oxycodone, and morphine), opioids used to treat addiction (e.g., methadone), as well as heroin, opium, and synthetic opioids (e.g., tramadol and fentanyl that may be prescription or illicitly-manufactured)* • Deaths with any of the following ICD-10 codes as any underlying cause of death: X40-44, X60-64, X85, Y10-14 AND • Any of the following ICD-10 codes as any other listed cause of death: T40.0, T40.1, T40.2, T40.3, T40.4, T40.6 OR Any cause of death text field contains the following keywords and common misspellings: heroin, fentanyl (and fentanyl analogs), methadone, buprenorphine, butalbital, codeine, eddp, hydrocodone, hydromorphone, levorphanol, meperidine, norbuprenorphine, oxycodone, oxymorphone, tapentadol, tramadol
Drug overdose death involving synthetic opioids other than methadone *Involves synthetic opioids other than methadone (e.g., tramadol and fentanyl that may be prescription or illicitly-manufactured). Note: polysubstance abuse deaths may also involve methadone or other opioids* • Deaths with any of the following ICD-10 codes as any underlying cause of death: X40-44, X60-64, X85, Y10-14 AND • The following ICD-10 code as any other listed cause of death: T40.4 OR Any cause of death text field contains the following keywords and common misspellings: fentanyl (and fentanyl analogs), tramadol
Drug overdose death involving heroin *Involves heroin. Note: polysubstance abuse deaths may also involve other opioids* • Deaths with any of the following ICD-10 codes as any underlying cause of death: X40-44, X60-64, X85, Y10-14 AND • The following ICD-10 code as any other listed cause of death: T40.1 OR Any cause of death text field contains the following keywords and common misspellings: heroin
Drug overdose death involving fentanyl *Note: polysubstance abuse deaths may also involve other opioids*

Any cause of death text field contains the following keywords and common misspellings: fentanyl (and fentanyl analogs)
Other Definitions or Limitations
Overdose death county represents the place of injury (where the overdose occurred), when the place of injury field was blank the county of the death certifier was used. Data by county of residence is available at https://oasis.state.ga.us/oasis/webquery/qryDrugOverdose.aspx.
Rate indicates deaths per 100,000 population using 2016 Census data as the denominator, and all rates are age-adjusted unless age category is presented.
Rates for categories with fewer than 5 deaths may not be accurate and are not presented in this report.
ICD-10 Code Description
X40-X44 (accidental poisonings by drugs), X60-X64 (intentional self-poisoning by drugs), X85 (assault by drug poisoning), Y10-Y14 (drug poisoning of undetermined intent), T40.0 (opium), T40.1 (heroin), T40.2 (natural and semisynthetic opioids), T40.3 (methadone), T40.4 (synthetic opioids, other than methadone, T40.6 (other and unspecified narcotics)

Source: Georgia DPH Drug Overdose Surveillance Report, 2016

Table 8.3: Nonfatal Overdoses (Morbidity) Case Definitions, Georgia, 2016

Data Source
Nonfatal overdose counts were derived from Georgia hospital discharge inpatient and ED visit data, and included all ED visits or hospitalizations occurring in a non-Federal acute care hospital in Georgia, among Georgia residents, with a discharge diagnosis indicating acute drug overdose during 2016
Case Definitions (categories are not mutually exclusive)
ED visit or hospitalization involving any drug overdose *May include any over-the-counter, prescription, or illicit drug* • Any mention of ICD-10CM codes: T36-T50 AND • 6th character: 1-4, and a 7th character of A or missing
ED visit or hospitalization involving any opioid overdose *Includes prescription opioid pain relievers (e.g., hydrocodone, oxycodone, and morphine), opioids used to treat addiction (e.g., methadone), as well as heroin, opium, and synthetic opioids (e.g., tramadol and fentanyl that may be prescription or illicitly-manufactured)* • Any mention of ICD-10CM codes: T40.0X, T40.1X, T40.2X, T40.3X, T40.4X, T40.60, T40.69 AND • 6th character: 1-4, and a 7th character of A or missing
ED visit or hospitalization involving a heroin overdose • Any mention of ICD-10CM code: T40.1X AND • 6th character: 1-4, and a 7th character of A or missing
Other Definitions or Limitations
County indicates the patient's county of residence.
Only black and white are indicated for race because of incomplete or sparse data on other races and ethnicities.
Patients that were admitted through the ED and subsequently hospitalized only appear in the hospital inpatient data.

Rate indicates ED visits or hospitalizations per 100,000 population using 2016 Census data as the denominator, and all rates are age-adjusted unless age category is presented.
Rates for categories with fewer than 5 ED visits or hospitalizations may not be accurate and are not presented in this report.
ICD-10 CM Code Description
Poisoning by: T36-T50 (range includes all drugs), T40.0X (opium), T40.1X (heroin), T40.2X (other opioids), T40.3X (methadone), T40.4X (synthetic narcotics), T40.60 (unspecified narcotics), T40.69 (other narcotics) 6th Character: 1 (accidental, unintentional), 2 (intentional self-harm), 3 (assault), 4 (undetermined intent) 7th Character: A (initial encounter) or missing

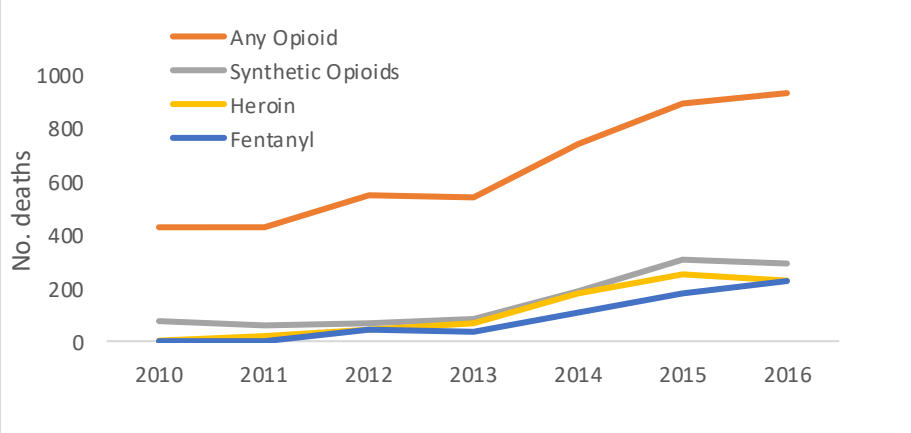
Source: Georgia DPH Drug Overdose Surveillance Report, 2016

Opioid-Overdose Related Mortality

Illicit opioids, such as heroin and fentanyl, drove the sharp increase in overall opioid-involved overdose deaths in GA, beginning in 2013. From 2010 to 2016, the number of opioid-involved overdose deaths increased by 117% in Georgia, from 426 to 929 deaths. (Figure 8.5). Since 2013, illicit opioids, such as heroin and fentanyl, has contributed to sharp increases in opioid-involved overdose deaths.

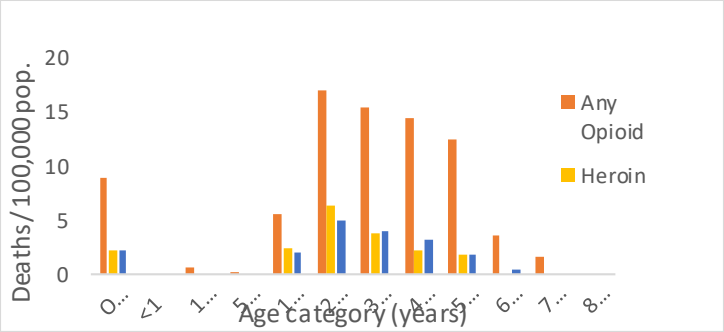
The highest numbers of heroin- and opioid-involved overdose deaths, ED visits, and hospitalizations occurred predominantly in urban areas (Atlanta Metropolitan Area, Augusta, Macon, Columbus, and Savannah). However, high rates of opioid overdose-involved ED visits and hospitalizations occurred in both urban and rural areas, particularly in North, South Central, and Southeast Georgia.

Figure 8.5: Opioid Overdose Deaths by Drug Type and Year, Georgia, 2010-2016



Note: All drugs may include any over-the-counter, prescription, or illicit drug. Any Opioid may include prescription or illicit opioids. Categories are not mutually exclusive.

Figure 8.6: Opioid Overdose Death Rates by Age and Drug Type, Georgia, 2016

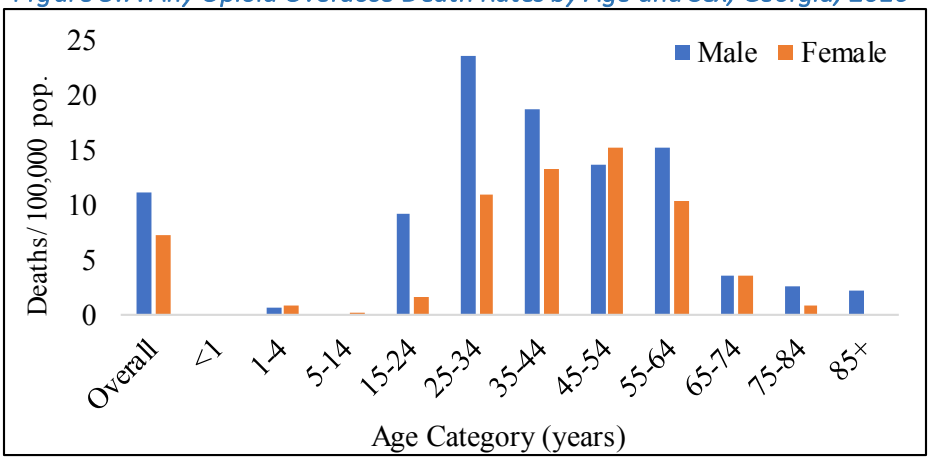


Persons aged 25-34 years visited an ED and/or died from an opioid-involved overdose more frequently than persons in other age categories, yet persons aged 65-74 years were most likely to be hospitalized because of an opioid-involved overdose. (Figure 8.6)

Note: All drugs may include any over-the-counter, prescription, or illicit drug. Any Opioid may include prescription or illicit opioids. Categories are not mutually exclusive.

Males aged 25-34 years died from an opioid-involved overdose more frequently than any other age category, and were 2.1 times more likely to die from an overdose than females of the same age category. (Figure 8.7)

Figure 8.7: Any Opioid Overdose Death Rates by Age and Sex, Georgia, 2016



Note: All drugs may include any over-the-counter, prescription, or illicit drug. Any Opioid may include prescription or illicit opioids. Categories are not mutually

Opioid-Overdose Related Morbidity

Persons aged 25-34 years were more likely to visit an ED because of an opioid-involved overdose than persons of other age categories, yet persons aged 65-74 years were most likely to be hospitalized because of an opioid-involved overdose. Heroin-involved overdoses occurred most frequently among persons aged 25-34 years, and were very uncommon among older persons. (Figures 8.8, 8.9)

Figure 8.8: Overdose ED Visit Rates by Drug Type and Age, Georgia 2016

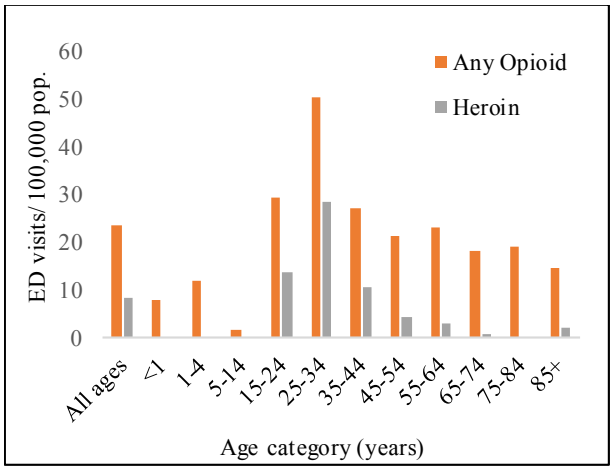
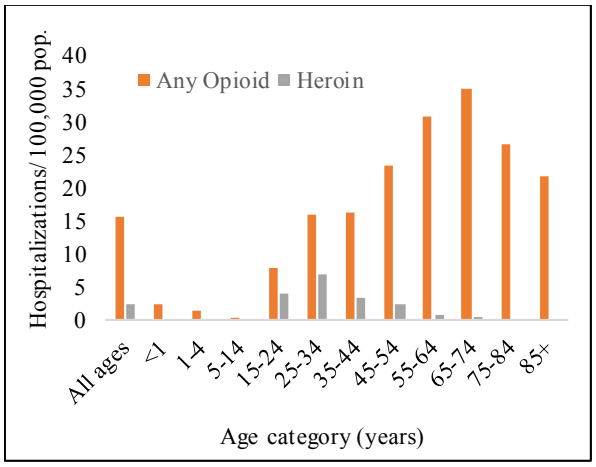
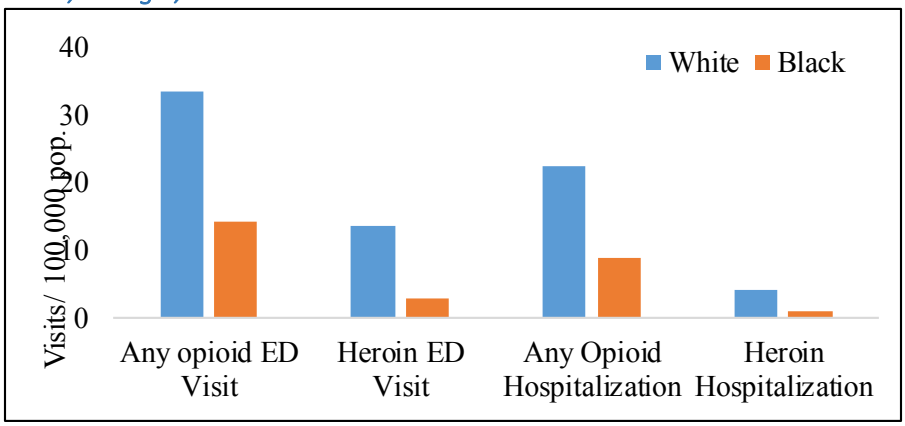


Figure 8.9: Overdose Hospitalization Rates by Drug Type and Age, Georgia 2016



Note: All drugs may include any over-the-counter, prescription, or illicit drug. Any Opioid may include prescription or illicit opioids. Categories are not mutually exclusive.

Figure 8.10: Opioid Overdose Emergency Department Visit and Hospitalization Rates by Drug Type and Race, Georgia, 2016



Whites were 2.3 times more likely to visit and ED for any opioid-involved overdose, and 4.5 times more likely to visit an ED for a heroin-involved overdose than Blacks (Figure 8.10)

Note: All drugs may include any over-the-counter, prescription, or illicit drug. Any Opioid may include prescription or illicit opioids. Categories are not mutually exclusive.

References:

[22] Zibbell, Jon et al. Increases in Hepatitis C Virus Infection Related to Injection Drug Use Among Persons Aged ≤30 Years -- Kentucky, Tennessee, Virginia, and West Virginia, 2006—2012. MMWR / 64(17);453-458. 8 May 2015.

[23] TEDS Substance abuse treatment admissions by primary substance of abuse, according to sex, age group, race, and ethnicity, 2014. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Treatment Episode Dataset (TEDS).

[24] Lankenau, S., Teti, M., Silva, K., Jackson Bloom, J., Harocopos, A., & Tresse, M. (2012b) Initiation into prescription opioid misuse among young injection drug users. International Journal of Drug Policy, 23: 37-44.

[25] CDC. Morbidity and Mortality Weekly Report (MMWR). Integrated Prevention Services for HIV Infection, Viral Hepatitis, Sexually Transmitted Diseases, and Tuberculosis for Persons Who Use Drugs Illicitly: Summary Guidance from CDC and the U.S. Department of Health and Human Services. Recommendations and Reports. November 9, 2012 / 61(RR05);1-40.

[26] CDC. Syringe Services Program Info Sheet. Reducing Harms from Injection Drug Use & Opioid Use Disorder with Syringe Services Programs. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Division of HIV/AIDS Prevention. August 2017.

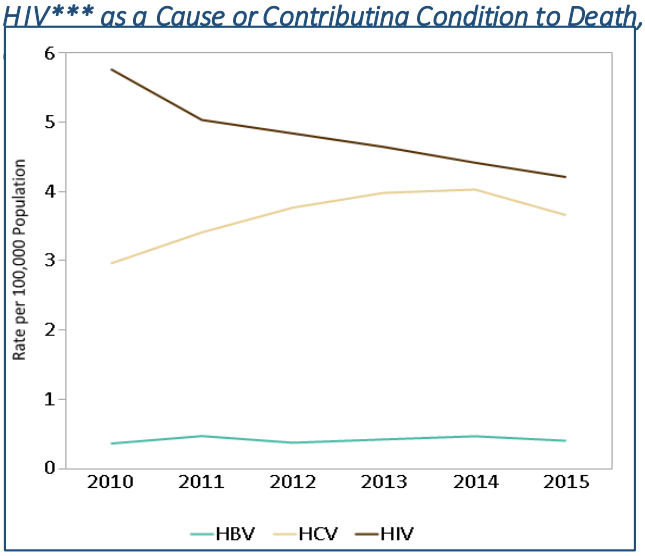
[27] CDC. Annual Surveillance Report of Drug-Related Risks and Outcomes — United States, 2017. Surveillance Special Report 1. Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. August 31, 2017.

Mortality Related to Viral Hepatitis, Georgia, 2010-2015

In 2013, annual HCV-related mortality in the US exceeded the total number of combined deaths from 60 other reportable infectious diseases, including HIV, pneumococcal disease, and tuberculosis. However, the actual number of these deaths was likely higher, as the data were collected from death certificates where HCV is often underreported as a cause of death.[28]

To assess the burden of viral hepatitis-related mortality in Georgia, death certificate data from 2010-2015 were collected based on corresponding ICD-10 codes for HBV, HCV, and HIV as causes and contributing factors leading to death. ICD-10 codes are assigned by the CDC, National Center for Health Statistics (NCHS) by extracting textual data obtained from Vital Records. Analysis of these data includes the first five reported ICD-10 codes for each decedent. The first ICD-10 code listed is the primary cause of death, with the following four codes listed being contributing factors.

Figure 9.1: Deaths Documenting HBV, HCV**, or HIV*** as a Cause or Contributing Condition to Death,*



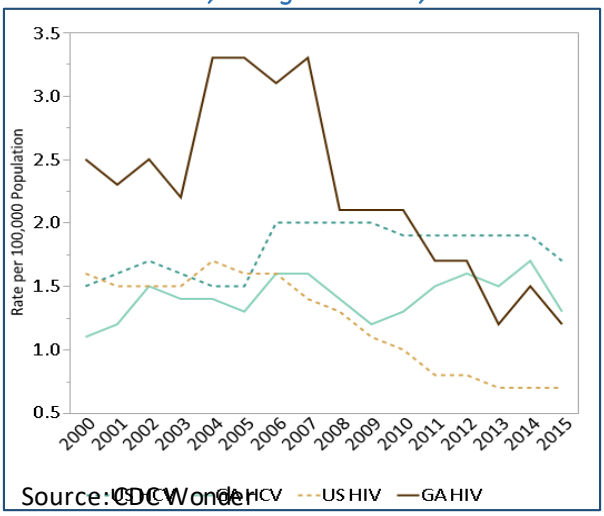
Sources for ICD-10 codes and population estimates: oasis.state.ga.us and US Census
*Defined by the following ICD-10 codes: B16, B16.0, B16.1, B16.2, B16.9, B17.0, B18.0, B18.1
**Defined by the following ICD-10 codes: B17.1, B18.2
***Defined by the following ICD-10 codes: B20, B20.0, B20.1, B20.2, B20.3, B20.4, B20.5, B20.6, B20.7, B20.8, B20.9, B21, B21.0, B21.1, B21.2, B21.3, B21.7, B21.8, B21.9, B22, B22.0, B22.1, B22.2, B22.7, B23, B23.0, B23.1, B23.2, B23.8, B24, Z21, R75
Note: Data include the first 5 reported ICD-10 codes only for each decedent

Georgia mortality rates for HCV-related conditions were lower than HIV-related deaths and much higher than HBV-related deaths. However, from 2010 to 2015, HIV-related death rates greatly decreased each year (5.8/100,000 population in 2010 to 4.2/100,000 population in 2015) while HCV-related death rates increased from 2010 (3.0/100,000 population) to 2014 (4.0/100,000 population). Similar to national trends, HCV-related death rates in Georgia decreased slightly from 4.0 per 100,000 population in 2014 to 3.7 per 100,000 population in 2015. In contrast with HCV and HIV mortality trends, HBV-related death rates in Georgia during 2010-2015 showed little change per year (average rate of 0.4/100,000 population). (Figure 13.1) It is important to note that, as with national mortality data, the number of deaths related to viral hepatitis in Georgia is most likely underreported.

HAV does not cause chronic infection and, therefore, it is rare for acute HAV infection to result in death. However, further analysis of these data showed HAV documented as a cause or contributing condition to death for 13 Georgia decedents during 2010-2015.

Research has shown that individuals chronically infected with HCV have an estimated 12 times higher mortality rate than the general US population.[29] From 2000-2015, Georgia's age-adjusted mortality rates for HCV were lower than those in the US, but deaths from HCV in the state did increase steadily from 2009-2012 prior to hitting a peak state rate of 1.7 per 100,000 population in 2014. The annual age-adjusted mortality rates for hepatitis C in Georgia have exceeded those for HIV since 2012. (Figure 13.2)

Figure 9.2: Age-adjusted Mortality Rates for HIV and HCV**, Georgia and U.S., 2000-2015*



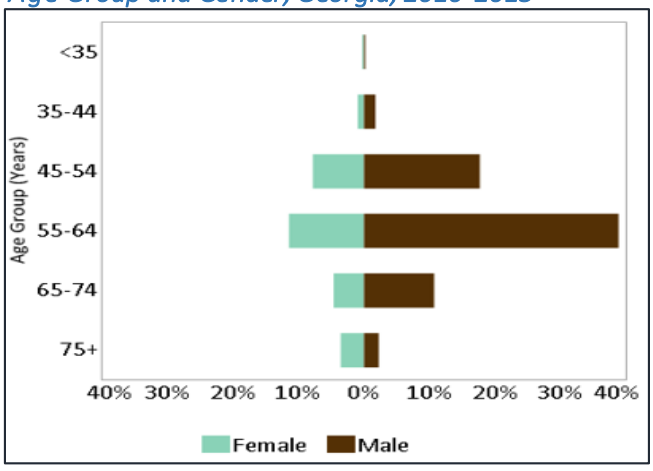
Source: CDC Wonder

*Defined by the following ICD-10 codes: B20.0, B21.0, B21.9, B22.0, B22.7, B24, R75

**Defined by the following ICD-10 codes: B17.1, B18.2

In 2015, the highest burden of HCV-related deaths in the United States was among those ages 55-64 years (23.7 deaths per 100,000 population).[30] The largest proportion of HCV-related deaths in Georgia from 2010-2015 also occurred among the 55-64 age group and was predominantly male. This is not surprising, as national surveillance data show that chronic HCV infection affects more males than females, especially among baby boomers.[30] Approximately 91% of all HCV-related deaths in Georgia from 2010-2015 occurred among those between the ages of 45 and 74 years, 74% of which were male. (Figure 13.3) These age groups include the baby boomer population (those born between 1945 and 1965), representing approximately 75% of chronic HCV infections and 73% of HCV-related mortality in the US.[31] The high mortality rate for Georgians in this age group may indicate late diagnosis of HCV and demonstrates the

Figure 9.3: Proportion of Deaths Documenting HCV as a Cause or Contributing Condition to Death, by Age Group and Gender, Georgia, 2010-2015*



Source for ICD-10 codes: oasis.state.ga.us

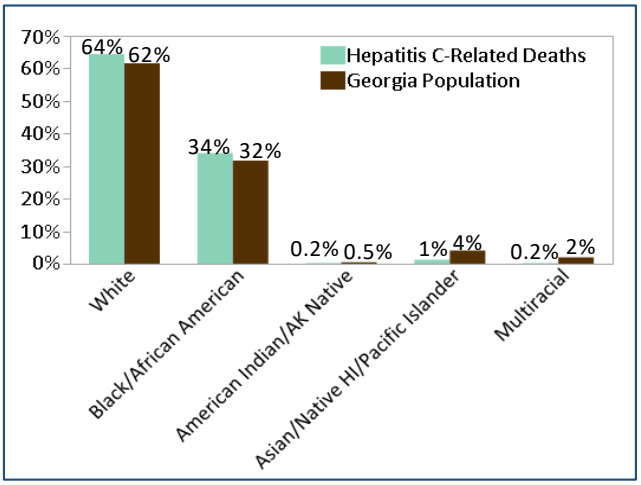
* Defined by the following ICD-10 codes: B17.1, 18.2

Note: Data include the first 5 reported ICD-10 codes only for each decedent

importance of testing, early detection, and need for access to HCV care and treatment for baby boomers.

Georgia's proportion of HCV-related deaths by race from 2010-2015 was distributed similarly to the state's population in 2015. From 2010-2015, the majority of HCV-related deaths in Georgia were white (n=1,628), followed by black/African-American (n=859), Asian/Native Hawaiian/Pacific Islander (n=32), American Indian/Alaska Native (n=4), and multiracial (n=4). (Figure 13.4)

Figure 9.4: Race of Georgia Deaths Documenting HCV as a Cause or Contributing Condition to Death vs. Race of all Georgians, 2010-2015*



Sources for ICD-10 codes and population estimates: oasis.state.ga.us and US Census
* Defined by the following ICD-10 codes: B17.1, B18.2
Note: Data includes the first 5 reported ICD-10 codes only for each decedent

Globally, an estimated 399,000 people die annually from HCV, with the majority of underlying causes attributed to cirrhosis and hepatocellular carcinoma.[32] Among the 2,527 HCV-related deaths in Georgia during 2010-2015, the most common leading underlying causes of death listed in death certificate data were chronic HCV (43%), followed by liver cell carcinoma (13%), unspecified liver issues (5%), and alcoholic cirrhosis of the liver (4%). (Table 13.1)

An estimated 1,800 people die each year from chronic HBV infection in the US.[33] Among the 279 HBV-related deaths in Georgia during 2010-2015, the most common leading underlying causes of death listed in vital records were acute HBV (28%), liver cell carcinoma (15%), chronic HBV (6%), and HIV resulting in multiple infections (3%). (Table 13.2)

Table 9.1: Leading Underlying Causes of Death among Decedents with HCV Documented as a Multiple Cause of Death, Georgia, 2010-2015*

ICD-10 Code	Number of Deaths	%	Description
B16.9	77	27.6%	Acute hepatitis B without delta-agent and without hepatic coma
C22.0	42	15.1%	Liver cell carcinoma
B18.1	16	5.7%	Chronic viral hepatitis B without delta-agent
B20.7	9	3.2%	HIV disease resulting in multiple infections
C22.9	9	3.2%	Liver, unspecified
K70.3	9	3.2%	Alcoholic cirrhosis of liver
B20.3	7	2.5%	HIV disease resulting in other viral infections
B18.2	6	2.2%	Chronic viral hepatitis C
B22.7	5	1.8%	HIV disease resulting in multiple diseases classified elsewhere
B23.8	5	1.8%	HIV disease resulting in other specified conditions
J44.9	5	1.8%	Chronic obstructive pulmonary disease, unspecified
C22.1	4	1.4%	Intrahepatic bile duct carcinoma
C34.9	4	1.4%	Bronchus or lung, unspecified
C85.9	4	1.4%	Non-Hodgkin's lymphoma, unspecified type
I25.1	4	1.4%	Atherosclerotic heart disease
K74.6	4	1.4%	Other and unspecified cirrhosis of liver
Other	69	24.7%	
Total	279	100.0%	

Source for ICD-10 codes: oasis.state.ga.us

* Defined by the following ICD-10 codes: B16, B16.0, B16.1, B16.2, B16.9, B17.0, B18.0, B18.1

Note: Data include the first 5 reported ICD-10 codes only for each decedent

Table 9.2: Leading Underlying Causes of Death among Decedents with HBV Documented as a Multiple Cause of Death, Georgia, 2010-2015*

ICD-10 Code	Number of Deaths	%	Description
B18.2	1090	43.1%	Chronic viral hepatitis C
C22.0	324	12.8%	Liver cell carcinoma
C22.9	125	4.9%	Liver, unspecified
K70.3	105	4.2%	Alcoholic cirrhosis of liver
K74.6	77	3.0%	Other and unspecified cirrhosis of liver
J44.9	45	1.8%	Chronic obstructive pulmonary disease, unspecified
C34.9	42	1.7%	Bronchus or lung, unspecified
I25.1	29	1.1%	Atherosclerotic heart disease
E14.9	23	0.9%	Unspecified diabetes mellitus without complications
I11.9	22	0.9%	Hypertensive heart disease without (congestive) heart failure
I21.9	22	0.9%	Acute myocardial infarction, unspecified
C78.7	21	0.8%	Secondary malignant neoplasm of liver
A41.9	20	0.8%	Septicaemia, unspecified
C25.9	19	0.8%	Pancreas, unspecified
Other	563	22.3%	
Total	2527	100.0%	

Source for ICD-10 codes: oasis.state.ga.us

* Defined by the following ICD-10 codes: B17.1, B18.2;

Note: Data include the first 5 reported ICD-10 codes only for each decedent

References:

[28] Ly KN, Hughes EM, Jiles RB, Holmberg SC. Risking Mortality Associated With Hepatitis C Virus in the United States, 2003-2013. Clinical Infectious Diseases. May 15, 2016; Vol. 62, Issue 10: 1287-1288.

[29] Mahajan R, Xing J, Liu S, et al. Rates and causes of mortality among people in care with hepatitis C virus infection--Chronic Hepatitis Cohort Study (CHeCS), 2006-2010. IDWeek 2013. October 2-6, 2013. San Francisco. Abstract 1774.

[30] CDC. Viral Hepatitis Surveillance – United States, 2015. https://www.cdc.gov/hepatitis/statistics/2015surveillance/pdfs/2015HepSurveillanceRpt.pdf

[31] CDC. Recommendations for the Identification of Chronic Hepatitis C Virus Infection Among Persons Born During 1945-1965. MMWR; 61 (RRO4); 1-18.

[32] Global Hepatitis Report 2017. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

[33] Ly KN, Xing J, Klevens RM, Jiles RB, Ward JW, Holmberg SD. The increasing burden of mortality from viral hepatitis in the United States between 1999 and 2007. Ann Intern Med 2012; 156:271-278.

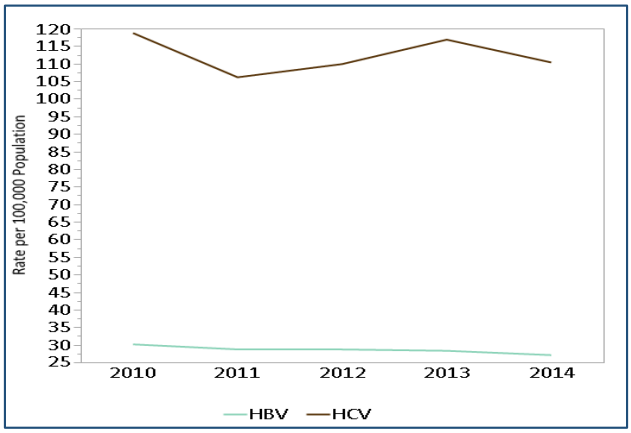
Hospitalizations and Emergency Room Visits Related to Viral Hepatitis

Studies have indicated that persons living with viral hepatitis in the US can easily spend hundreds of thousands of dollars on health care costs in their lifetime.[34] To better assess the burden of viral hepatitis morbidity in Georgia, data about inpatient hospitalizations and emergency room visits related to HBV and HCV in Georgia from 2010 to 2014 were compiled from DPH's Online Analytical Statistical Information System (OASIS) using corresponding ICD-9 codes. Specific ICD-9 codes used are listed below (Table 10.1). It should be noted that morbidity data represented in this profile were analyzed by the number of visits rather than by the number of patients; therefore, each visit to an emergency room and each hospitalization was included in the analysis.

Table 10.1: ICD-9 Codes Used to Obtain HBV and HCV-related Hospitalization and Emergency Room Visit Data, Georgia, 2010-2014

All data was obtained from the Georgia DPH OASIS using ICD-9 codes listed below. Analysis includes the first 10 ICD-9 codes only for each visit.	
HBV	
70.2	Viral hepatitis B with hepatic coma acute or unspecified without hepatitis delta
70.21	Viral hepatitis B with hepatic coma acute or unspecified with hepatitis delta
70.22	Chronic viral hepatitis B with hepatic coma without hepatitis delta
70.23	Chronic viral hepatitis B with hepatic coma with hepatitis delta
70.3	Viral hepatitis B without hepatic coma acute or unspecified without hepatitis delta
70.31	Viral hepatitis B without hepatic coma acute or unspecified with hepatitis delta
70.32	Chronic viral hepatitis B without hepatic coma without hepatitis delta
70.33	Chronic viral hepatitis B without hepatic coma with hepatitis delta
V02.61	Carrier or suspected carrier of hepatitis B
HCV	
70.41	Other specified viral hepatitis with hepatic coma, hepatitis C
70.44	Chronic hepatitis C with hepatic coma
70.51	Other specified viral hepatitis without mention of hepatic coma, hepatitis C
70.54	Chronic hepatitis C without hepatic coma
70.7	Hepatitis C without hepatic coma (Not otherwise specified)
70.71	Hepatitis C with hepatic coma (Not otherwise specified)
V02.62	Hepatitis C carrier
HIV	
42	HIV disease
V08	Asymptomatic HIV infection status
79.53	HIV type 2 (HIV-2)
795.71	Nonspecific serologic evidence of HIV

Figure 10.1: Hospitalizations Documenting Diagnoses of HBV and HCV*, Georgia, 2010-2014*

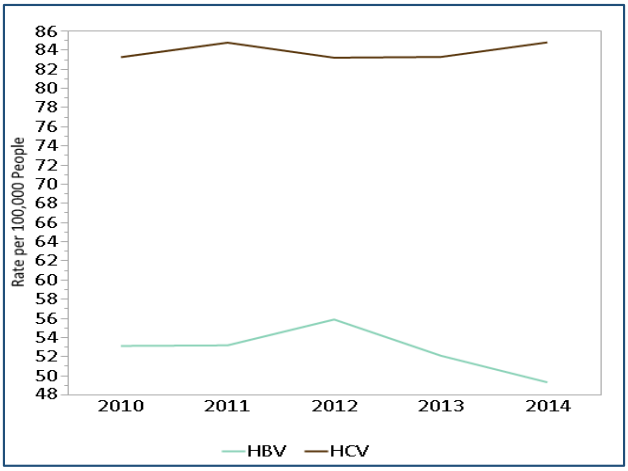


**Refer to Table 10.1 for data sources.*
Population estimates were obtained from US Census.

Between 2010 and 2014, there were 28,304 HBV-related hospitalizations and 111,328 HCV-related hospitalizations in Georgia. During this time, hospitalization rates for HBV decreased slightly from 30.1/100,000 population in 2010 to 27.1/100,000 population in 2014. HCV-related hospitalization rates were less consistent, decreasing from 2010 (118.7/100,000 population) to 2011 (106.1/100,000 population); increasing in 2013 (116.8/100,000 population); and then decreasing once again in 2014 (110.3/100,000 population). (Figure 10.1)

There were 52,176 HBV-related and 83,054 HCV-related emergency room visits in Georgia between 2010 and 2014. Emergency room visit rates for HBV increased from 2010 (53.1/100,000 population) to 2012 (55.8/100,000 population), but then decreased in 2014 (49.3/100,000 population). HCV-related emergency room visit rates did not fluctuate much between 2010 and 2014, averaging 83.8 per 100,000 population and peaking at 84.8 per 100,000 population in 2014. (Figure 10.2)

Figure 10.2: Emergency Room Visits Documenting Diagnoses of HBV and HCV*, Georgia, 2010-2014*

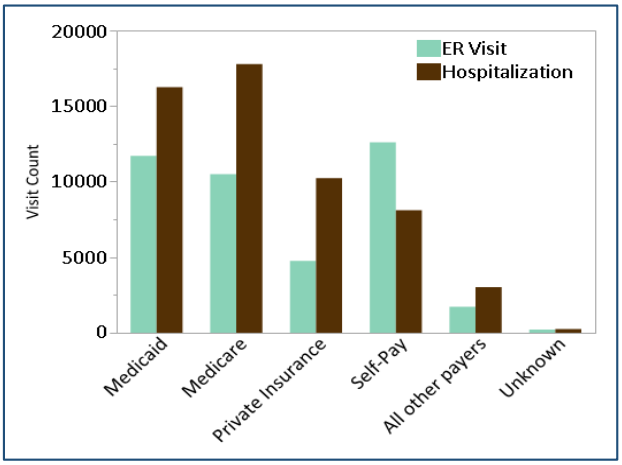


**Refer to Table 10.1 for data sources.*
Population estimates were obtained from US Census.

Multiple national studies have mentioned higher healthcare costs associated with HCV infection.[35] Furthermore, hospitalization rates in the US are approximately three times higher among patients chronically infected with HCV, and an estimated $10.7 billion are expected to be spent in medical expenditures for these patients between 2010 and 2020.[36] To assist planning for future costs in Georgia, HCV-related emergency room visits (n=41,527) and

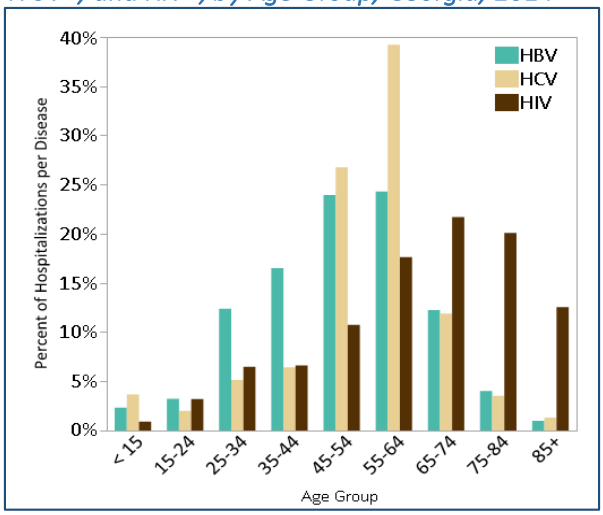
inpatient hospitalizations (n=55,664) between 2010 and 2014 were analyzed by payor type. The majority of HCV-related emergency room visit costs were covered by self-pay (30%), Medicaid (28%), and Medicare (25%). For HCV-related hospitalizations, the predominant payor types were Medicare (32%), Medicaid (29%), and private insurance (18%). Approximately 1% (n=470) of all emergency room visits and hospitalizations associated with HCV in Georgia from 2010 to 2014 had an unknown payor type and 5% (n=4,750) were in an "other payor" category, which included 19 PeachCare visits. (Figure 10.3)

Figure 10.3: Emergency Room Visits and Inpatient Hospitalizations Documenting Diagnoses of HCV, by Payor Type, Georgia, 2010-2014*



Refer to Table 10.1 for data sources.
Note: Data may contain duplicate visits (e.g., Admissions following ER visits may appear twice.)

Figure 10.4: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HBV, HCV*, and HIV*, by Age Group, Georgia, 2014*

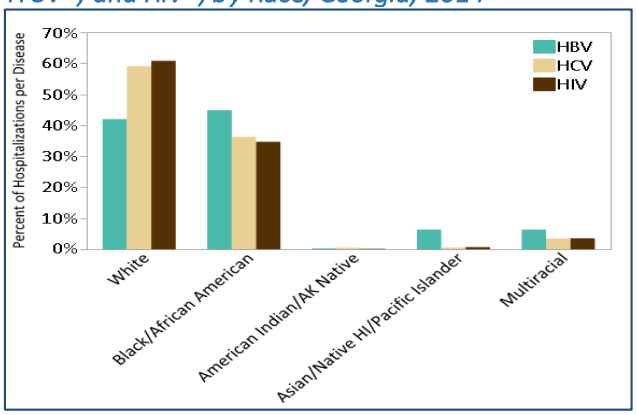


**Refer to Table 13.1 for data sources.*
Note: 2,648 visits were excluded from the dataset due to unknown age

Viral hepatitis health care costs have often been associated with comorbidities, such as HIV and substance abuse disorders.[37] In fact, studies have found viral hepatitis to be one of the most prominent causes of morbidity and mortality among persons living with HIV in the US.[38] To further assess the burden of viral hepatitis and HIV morbidity in Georgia, ICD-9 codes for HIV-related inpatient hospitalizations from 2014 were compiled and compared to HBV- and HCV-related hospitalizations that occurred within the same year. There were 268,353 total HIV-related hospitalizations statewide in 2014, 36% of which were among baby boomers. The age breakdown of Georgia hospitalizations in 2014 differed by disease, with nearly half of hospitalizations related to HBV occurring in 45-64 years age group. The majority of HCV-related hospitalizations were in the 55-64 years age group (37%) and HIV-related hospitalizations in the 65-74 years age group (22%). (Figure 10.4; Table 10a) Racial disparities are noted in these data. Persons hospitalized in Georgia for HCV and HIV in 2014 were predominantly White (59% and 61%, respectively). (Figure 10.5) However, Blacks and African Americans in Georgia were disproportionately affected, as this population represented 32% of

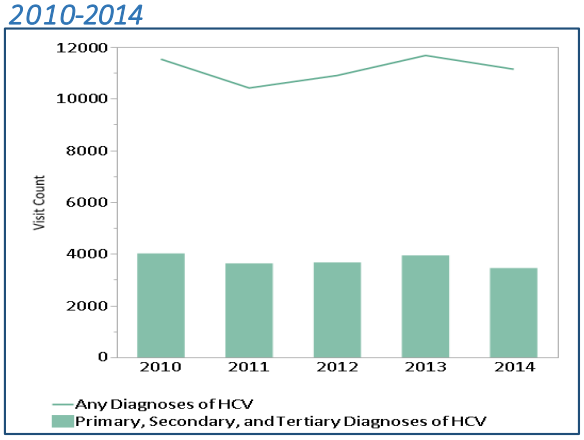
the state's population in 2014, yet comprised 45% of HBV-related hospitalizations, 36% of HCV-related hospitalizations, and 35% of HIV-related hospitalizations in the same year. Similar to national trends that have shown Asian and Pacific Islanders to be disproportionately affected by HBV, Asian/Native Hawaiian/Pacific Islanders in Georgia made up 6% of hepatitis B-related hospitalizations in 2014, yet constituted only 4% of the state's total population that year. Of the 1,552 acute HCV cases reported nationally in 2015, approximately 53% reported hospitalization as a result of HCV infection.[39]

Figure 10.5: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HBV, HCV*, and HIV*, by Race, Georgia, 2014*



Refer to Table 10.1 for data sources.

Figure 10.6: Inpatient Hospitalizations Documenting Diagnoses of HCV, Georgia, 2010-2014*



Refer to Table 10.1 for data sources.

In Georgia, approximately 34% of the 55,664 HCV-related inpatient hospitalizations from 2010 to 2014 listed HCV as a primary, secondary, or tertiary diagnosis. (Figure 10.6) Moreover, the leading primary admittance diagnoses among HCV-related hospitalizations in the state during this time were encounters for antineoplastic chemotherapy, chronic HCV with hepatic coma, and pneumonia (organism unspecified). (Table 10.2)

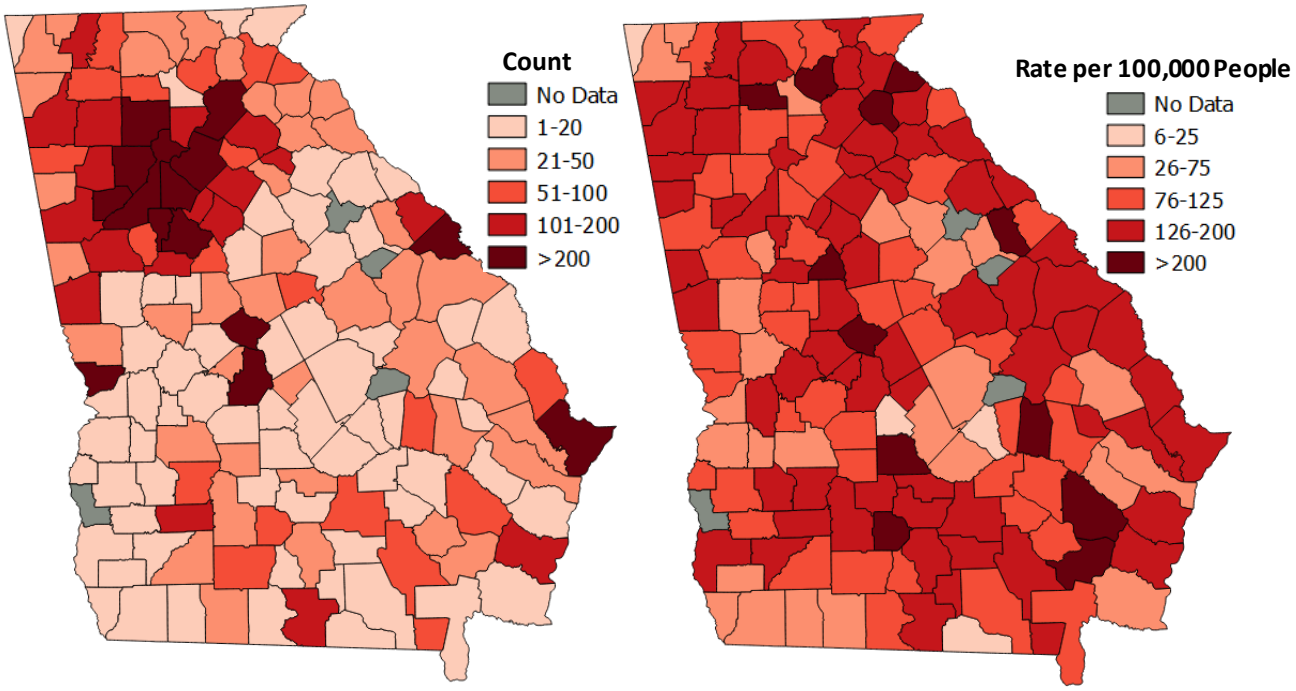
Table 10.2: Top 10 Primary Admittance Diagnoses of Hospitalizations with HCV, Georgia, 2010-2014*

Rank	ICD-9 Code	Description	Count
1	V58.11	Encounter for antineoplastic chemotherapy	1304
2	70.44	Chronic Hepatitis C with Hepatic Coma	1259
3	486	Pneumonia Organism Unspecified	1253
4	571.2	Alcoholic Cirrhosis of Liver	1216
5	38.9	Unspecified Septicemia	1083
6	584.9	Acute Renal Failure Unspecified	1015
7	70.71	Unspecified viral hepatitis C with hepatic coma	986
8	577	Diseases of Pancreas	901
9	491.21	Obstructive Chronic Bronchitis with Acute Exacerbation	797
10	414.01	Coronary Atherosclerosis of Native Coronary Artery	763

Refer to Table 10.1 for data

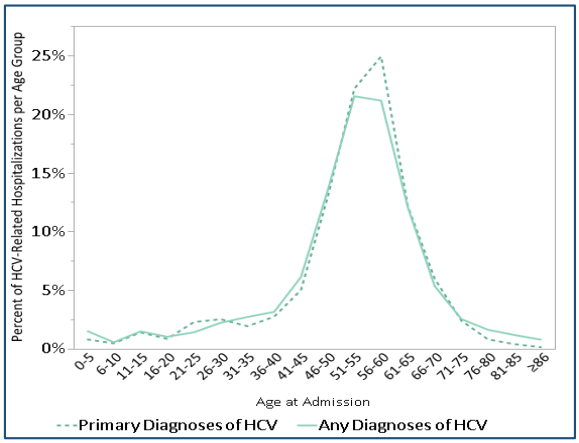
To better assess the geographic distribution of HCV morbidity in Georgia, counts and rates of inpatient hospitalizations with documented primary or secondary diagnoses of HCV from 2010 to 2014 were mapped by County. (Figure 10.7) Counties with the highest counts of primary or secondary diagnoses for HCV during this time were mostly in the Atlanta metro area: Fulton (n=1,330), DeKalb (n=895), Cobb (n=883), and Gwinnett (n=719) Counties. The fifth-highest count was Chatham County (n=432), which is located in the southeastern coastal region of the state. The geographic distribution of these HCV diagnoses were quite different when adjusted by county population size, with three of the top five counties located in northern Georgia (Stephens at 290.4/100,000 population, Banks at 246.0/100,000 population, and Pickens at 226.1/100,000 population) and the two remaining counties located in middle Georgia (Butts at 231.1/100,000 population and Wilcox at 226.1/100,000 population).

Figure 10.7: Inpatient Hospitalizations Documenting Primary or Secondary Diagnoses of HCV, by County, Georgia, 2010-2014*



**Refer to Table 10.1 for data sources.*

Figure 10.8: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HCV, by Age Group, Georgia, 2010-2014*

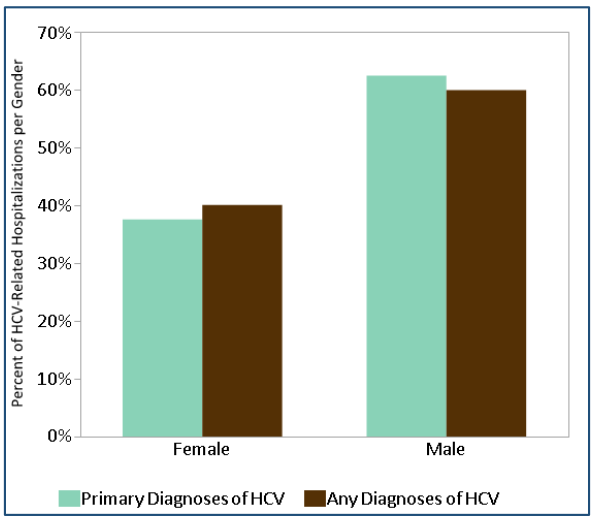


**Refer to Table 10.1 for data sources.*
Note: 3,177 visits were excluded from the dataset due to unknown age

Chronic manifestations of HCV are expected to increase in the US, since 75% of those infected are within the aging baby boomer cohort.[38] In line with this national prediction, patients between the ages of 46 and 65 years comprised 70% of those hospitalized with HCV-related primary diagnoses and 65% of all HCV-related diagnoses in Georgia during 2010-2014. (Figure 10.8)

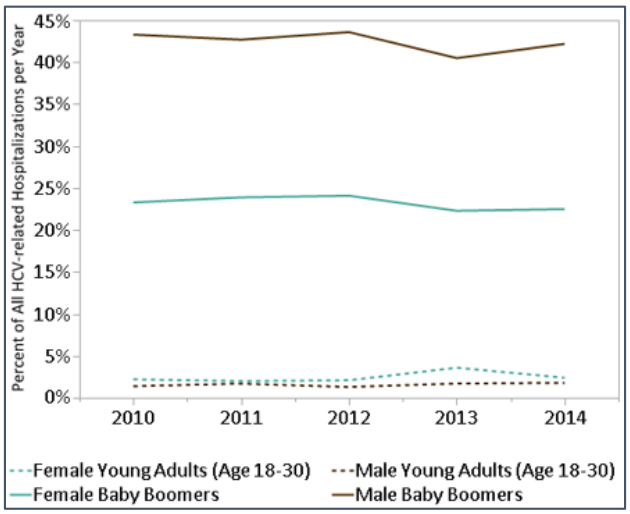
Males made up approximately 62% of those hospitalized with primary diagnoses of HCV and 60% of all diagnoses of HCV in Georgia during 2010-2014. (Figure 10.9) When stratified by age, however, Georgia females within the younger cohort for HCV (between 18 and 30 years of age) had slightly higher annual percentages of HCV-related hospitalizations than their male counterparts from 2010-2014. (Figure 10.10)

Figure 10.9: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HCV, by Gender, Georgia, 2010-2014*



**Refer to Table 10.1 for data sources.*

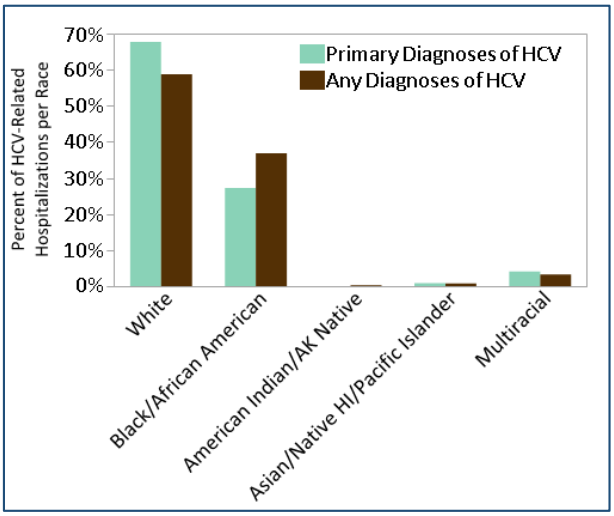
Figure 10.10: Proportion of Inpatient Hospitalizations Documenting Any Diagnoses of HCV, by Gender and Age Group, Georgia, 2010-2014*



**Refer to Table 10.1 for data sources.*
Note: 3,177 visits were excluded from the dataset due to unknown age

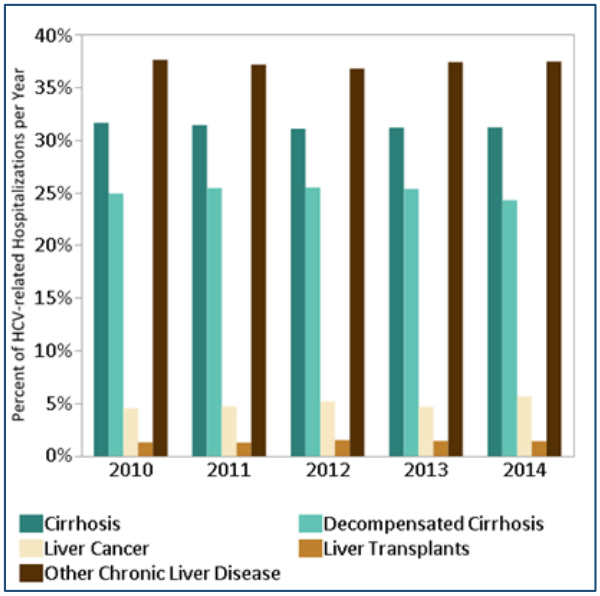
The majority of both primary (68%) and all (59%) diagnoses for HCV hospitalizations in Georgia from 2010-2014 occurred among Whites, followed by Blacks and African Americans (primary diagnoses at 27% and all diagnoses at 37%), multiracial (primary diagnoses at 4% and all diagnoses at 3%), and Asian/Native Hawaiian/Pacific Islanders (primary diagnoses at 1% and all diagnoses at 1%). (Figure 10.11) American Indian/Alaska Natives comprised only 0.07% of primary diagnoses and 0.25% of all diagnoses for HCV hospitalizations in Georgia for the same years. The higher percentage of primary HCV diagnoses seen among Whites in Georgia from 2010-2014 may reflect the increased incidence of acute hepatitis C cases seen within that population during the same time.

Figure 10.11: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HCV, by Race, Georgia, 2010-2014*



Refer to Table 10.1 for data sources.

Figure 10.12: Proportion of Inpatient Hospitalizations Documenting Diagnoses of HCV, by Category of Liver Disease and Year of Discharge, Georgia, 2010-2014*



Refer to Table 10b in Appendices for data sources.

In the US, the leading cause of liver disease and most common reason for liver transplantation is viral hepatitis.[40] It often takes decades for any signs or symptoms to appear in chronic hepatitis C patients, at which point liver scarring (cirrhosis), end-stage liver disease, or liver cancer (hepatocellular carcinoma) could occur.[37] An estimated 10%-20% of chronic hepatitis C patients develop progressive liver damage over a time period of two to three decades.[41] When corresponding ICD-9 codes for hepatitis C-related hospitalizations in Georgia from 2010-2014 were grouped and categorized by liver disease type, the majority of diagnoses were in the "Other Chronic Liver Disease" category (37%), followed by "Cirrhosis" (31%), "Decompensated Cirrhosis" (25%), "Liver Cancer" (5%), and "Liver Transplants" (1%). (Figure 10.12 and Table 10b)

Table 10a: Inpatient Hospitalizations Documenting Diagnoses of HBV*, HCV**, and HIV***, Georgia 2014

	Total			≤ 30 years			Baby Boomers		
	HBV Count (%)	HCV Count (%)	HIV Count (%)	HBV Count (%)	HCV Count (%)	HIV Count (%)	HBV Count (%)	HCV Count (%)	HIV Count (%)
Total	2,734	11,142	268,353	965	1,412	22,664	959	7,203	95,888
Age Group (years)									
< 15	765 (28)	884 (8)	3,972 (1)	---	---	---	---	---	---
15-24	65 (2)	214 (2)	8,565 (3)	---	---	---	---	---	---
25-34	250 (9)	549 (5)	17,341 (6)	---	---	---	---	---	---
35-44	333 (12)	684 (6)	17,701 (7)	---	---	---	---	---	---
45-54	483 (18)	2,851 (26)	28,720 (11)	---	---	---	---	---	---
55-64	490 (18)	4,176 (37)	47,028 (18)	---	---	---	---	---	---
65-74	247 (9)	1,266 (11)	57,905 (22)	---	---	---	---	---	---
75-84	81 (3)	376 (3)	53,626 (20)	---	---	---	---	---	---
85+	20 (1)	142 (1)	33,495 (12)	---	---	---	---	---	---
Race									
American Indian/AK Native	8 (0)	58 (1)	466 (0)	5 (1)	3 (0)	53 (0)	2 (0)	13 (0)	175 (0)
Asian/Pacific Islander	174 (6)	69 (1)	1,952 (1)	41 (4)	15 (1)	196 (1)	47 (5)	24 (0)	668 (1)
Black/African American	1,228 (45)	4,041 (36)	93,145 (35)	331 (34)	514 (36)	11,059 (49)	474 (49)	2,875 (40)	38,530 (40)
White	1,149 (42)	6,584 (59)	163,184 (61)	507 (53)	793 (56)	9,866 (44)	397 (41)	4,082 (57)	53,461 (56)
Multiracial	175 (6)	390 (4)	9,606 (4)	81 (8)	87 (6)	1,490 (7)	39 (4)	209 (3)	3,054 (3)
Ethnicity									
Hispanic	109 (4)	293 (3)	8,700 (3)	59 (6)	36 (3)	1,104 (5)	27 (3)	188 (3)	3,010 (3)
Non-Hispanic	2,596 (95)	10,808 (97)	257,837 (96)	891 (92)	1,369 (97)	21,402 (94)	923 (96)	6,988 (97)	92,274 (96)
Unknown	29 (1)	41 (0)	1,816 (1)	15 (2)	7 (0)	158 (1)	9 (1)	27 (0)	604 (1)

Sources for ICD-9 codes: oasis.state.ga.us

*Defined by the following ICD-9 codes: 70.2, 70.21, 70.22, 70.23, 70.3, 70.31, 70.32, 70.33, V02.61

**Defined by the following ICD-9 codes: 70.41, 70.44, 70.51, 70.54, 70.7, 70.71, V02.62

*** Defined by the following ICD-9 codes: 42, V08, 79.53, 795.71

Note: Data include the first 10 reported ICD-9 codes only for each visit

Table 10b: Inpatient Hospitalizations with Diagnoses of Hepatitis C, by Category of Liver Disease and Year of Discharge, Georgia, 2010-2014

	Cirrhosis*	Decompensated Cirrhosis**	Other Chronic Liver Disease***	Liver Transplants^	Liver Cancer+	Total
	Count (%)	Count (%)	Count (%)	Count (%)	Count (%)	
2010	2,441 (31.6)	1,925 (24.9)	2,903 (37.6)	101 (1.3)	352 (4.6)	7,722
2011	2,593 (31.4)	2,101 (25.4)	3,067 (37.1)	107 (1.3)	391 (4.7)	8,259
2012	2,748 (31.0)	2,255 (25.5)	3,255 (36.8)	136 (1.5)	459 (5.2)	8,853
2013	2,625 (31.2)	2,134 (25.3)	3,148 (37.4)	122 (1.4)	394 (4.7)	8,423
2014	2,642 (31.2)	2,058 (24.3)	3,171 (37.4)	121 (1.4)	480 (5.7)	8,472
All Years (2010 to 2014)	13,049 (31.3)	10,473 (25.1)	15,544 (37.2)	587 (1.4)	2,076 (5.0)	41,729

Sources for ICD-9 codes: oasis.state.ga.us

*Defined by the following ICD9 codes: 571.2, alcoholic cirrhosis of liver; 571.5, cirrhosis of liver without alcohol; 571.6, biliary cirrhosis

**Defined by the following ICD9 codes: 348.3,348.39 encephalopathy not classified elsewhere; 456, 456.1, esophageal varices with/without bleeding; 456.2, 456.21, esophageal varices in diseases classified elsewhere with/without bleeding; 572.2, hepatic encephalopathy; 572.3, portal hypertension; 572.4, hepatorenal syndrome; 789.5, ascites elsewhere with/without bleeding

***Defined by the following ICD9 codes: 571 chronic liver disease and cirrhosis, alcoholic fatty liver; 571.1 acute alcoholic hepatitis; 571.3 alcoholic liver damage unspecified; 571.4 chronic hepatitis unspecified; 571.41 chronic persistent hepatitis; 571.42 autoimmune hepatitis; 571.49 other chronic hepatitis; 571.8 other chronic nonalcoholic liver disease; 571.9 unspecified chronic liver disease without alcohol; 572 abscess of liver; 572.1 portal pyemia; 572.8 other sequelae of chronic liver disease; 573 chronic passive congestion of liver; 573.1 hepatitis in viral diseases classified elsewhere; 573.2 hepatitis in other infectious diseases classified elsewhere; 573.3 hepatitis unspecified; 573.4 hepatic infarction; 573.8 other specified disorders of liver; 573.9 unspecified disorder of liver

^Defined by the following ICD9 codes: 996.82, complications of transplanted liver; V42.7, liver replaced by transplant

+Defined by the following ICD9 codes: 155, 155.2, 197.7, V10.07 malignant neoplasm of liver

Note: Data includes the first 10 reported ICD-9 codes only for each visit

References:

[34] Institute of Medicine. Hepatitis and Liver Cancer: A National Strategy for Prevention and Control of Hepatitis B and C. Washington, DC: National Academies Press; 2010.

[35] Younossi ZM, et al. Clinical outcomes and resource utilisation in Medicare patients with chronic liver disease: a historical cohort study. BMJ Open. 2014 May 16;4(5):e004318.

[36] Davis, KL, et al. Direct economic burden of chronic hepatitis c virus in a United States managed care population. J Clin Gastroenterol. 2011; 45:e17-e24

[37] Department of Health and Human Services (US) Action plan for the prevention, care, and treatment of viral hepatitis, 2014–2016 Available from: http://aids.gov/pdf/viral-hepatitis-action-plan.pdf.

[38] Smith C, Sabin CA, Lundgren JD, et al. Factors associated with specific causes of death amongst HIV-positive individuals in the D:A:D Study. Aids. 2010 Jun 19;24(10):1537–1548.

[39] CDC. Viral Hepatitis Surveillance – United States, 2015. https://www.cdc.gov/hepatitis/statistics/2015surveillance/pdfs/2015HepSurveillanceRpt.pdf.

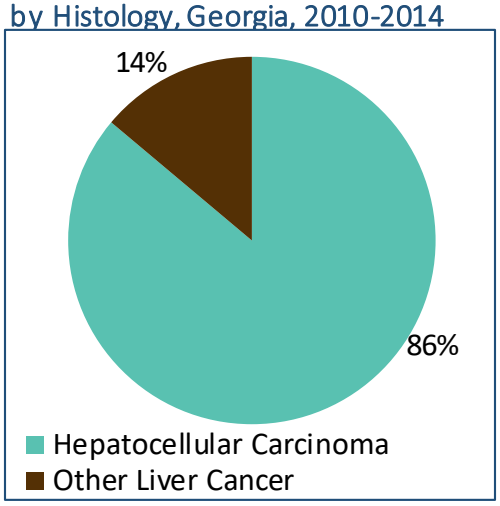
[40] Centers for Disease Control and Prevention. Viral hepatitis. http://www.cdc.gov/hepatitis/. Accessed January 7, 2014.

[41] Ward JW. The hidden epidemic of hepatitis C virus infection in the United States: occult transmission and burden of disease. Top Antivir Med. 2013 Feb-Mar;21(1):15-9.

Liver Cancer in Georgia

The Annual Report to the Nation on the Status of Cancer, 1975-2012 (ARN), reported that liver cancer rates in the US increased by 72% between 2003 and 2012. Further, there has been a 56% increase in mortality related to liver cancer in the US since 2003. One of the main types of liver cancer is hepatocellular carcinoma (HCC), over 60% of which, globally, is attributed to HBV and/or HCV infections.[42] In the U.S., 15% of liver cancer incidence is related to chronic HBV infection and 50% is related to chronic HCV infection.[43] The ARN also indicated that HCV and liver cancer-associated death rates were the highest among baby boomers.[42]

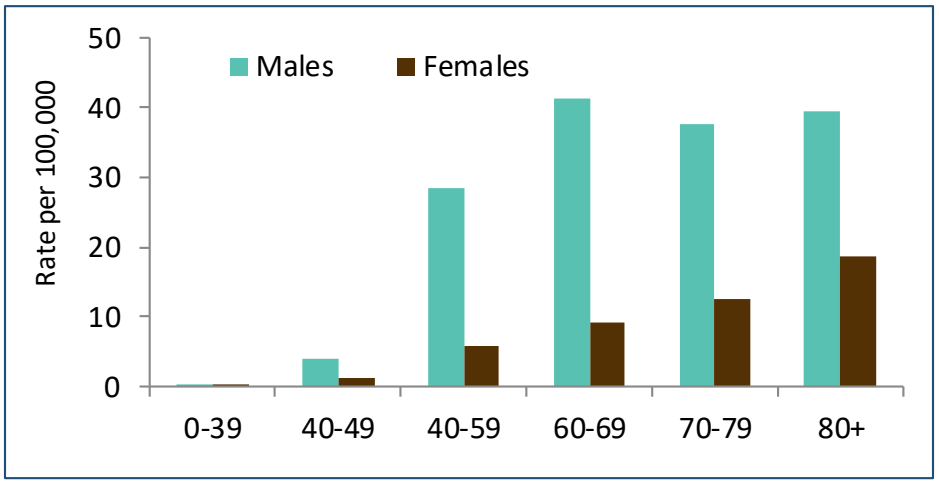
Figure 11.1: Invasive Liver Cancer Incidence by Histology, Georgia, 2010-2014



Source: Georgia DPH, GCCR, 2017.

Based on data from the Georgia Comprehensive Cancer Registry (GCCR), 86% of new liver cancer diagnoses in GA are HCC. (Figure 11.1) Overall, males had higher incidence rates of liver cancer than females, across all age groups. Liver cancer rates were highest in those over 60 years of age. (Figure 11.2) Further, liver cancer morbidity ranks 11th for males and 18th for females among all causes, while mortality related to liver cancer ranks 5th for males and 11th for females (Table 11.1)

Figure 11.2: Liver Cancer Incidence Rates, by Age Group and Sex, Georgia, 2010-2014



Source: Georgia DPH, GCCR, 2017

Table 11.1: Top Cancer Incidence Sites and Cancer-Related Deaths, Georgia, 2010-2014

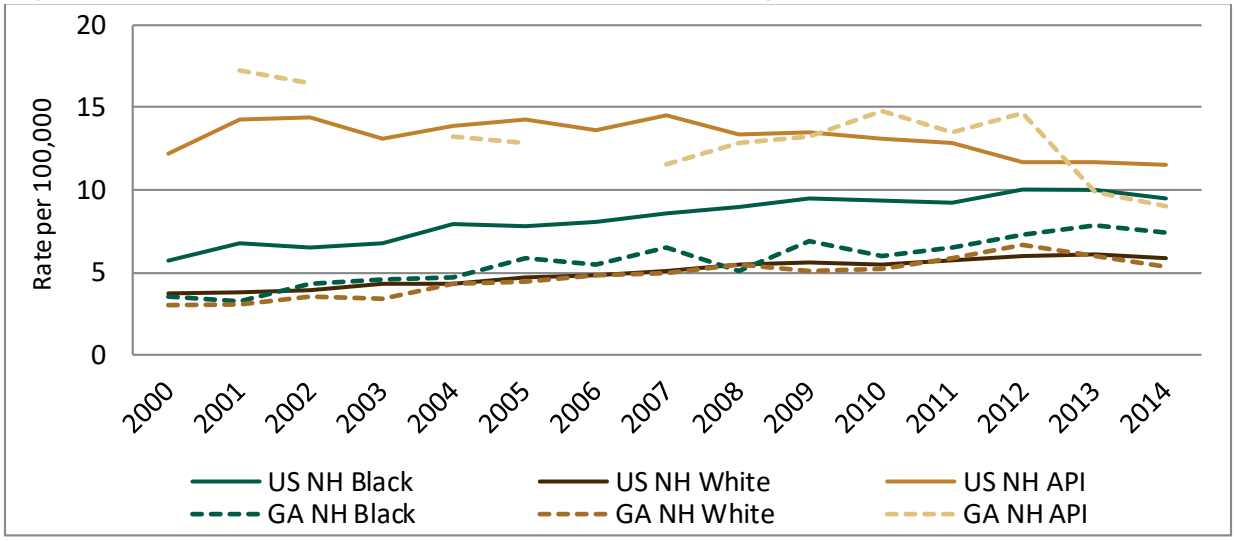
	Cases		Deaths	
Rank	**Males**	**Females**	**Males**	**Females**
1	Prostate	Breast	Lung & Bronchus	Lung & Bronchus
2	Lung & Bronchus	Lung & Bronchus	Colon & Rectum	Breast
3	Colon & Rectum	Colon & Rectum	Prostate	Colon & Rectum
4	Melanoma	Uterine Corpus	Pancreas	Pancreas
5	Bladder (Incl in situ)	Melanoma	Liver	Ovary
6	Kidney & Renal Pelvis	Thyroid	Leukemias	Uterine Corpus & Uterus, NOS
7	Non-Hodgkin Lymphoma	Non-Hodgkin Lymphoma	Esophagus	Leukemias
8	Oral Cavity	Ovary	Bladder	Non-Hodgkin Lymphoma
9	Leukemias	Pancreas	Non-Hodgkin Lymphoma	Brain & Other Nervous System
10	Pancreas	Kidney & Renal Pelvis	Brain & Other Nervous System	Multiple Myeloma
11	Liver	Leukemias	Kidney & Renal Pelvis	Liver
12	Multiple Myeloma	Bladder (Incl in situ)	Stomach	Uterine Cervix
13	Stomach	Uterine Cervix	Oral Cavity	Stomach
14	Esophagus	Oral Cavity	Multiple Myeloma	Bladder
15	Brain & Other Nervous System	Multiple Myeloma	Melanoma	Kidney & Renal Pelvis
16	Larynx	Brain & Other Nervous System	Larynx	Oral Cavity
17	Thyroid	Stomach	Hodgkin Lymphoma	Melanoma
18	Testis	Liver	Thyroid	Esophagus

Sources: GA Incidence: Georgia DPH GCCR, 2017; GA Mortality: Georgia DPH, Office of Vital Statistics

Incidence rates of liver cancer are highest among the Asian/Pacific Islander (API) population both in Georgia and in the US. However, rates have been decreasing in this population in Georgia since 2012. Rates among both US and GA non-Hispanic (NH) Blacks have been increasing (5.3% per year and 5.1% per year, respectively) during the past decade, though this trend appears to have slowed down in more recent years. Similarly rates among US and GA NH

whites increased by 5.3% per year and 6.4% per year during the 2000s and appear to have leveled off during more recent years. (Figure 11.3)

Figure 11.3: Trends in Liver Cancer Incidence Rates*, Georgia and the United States, 2000-2014

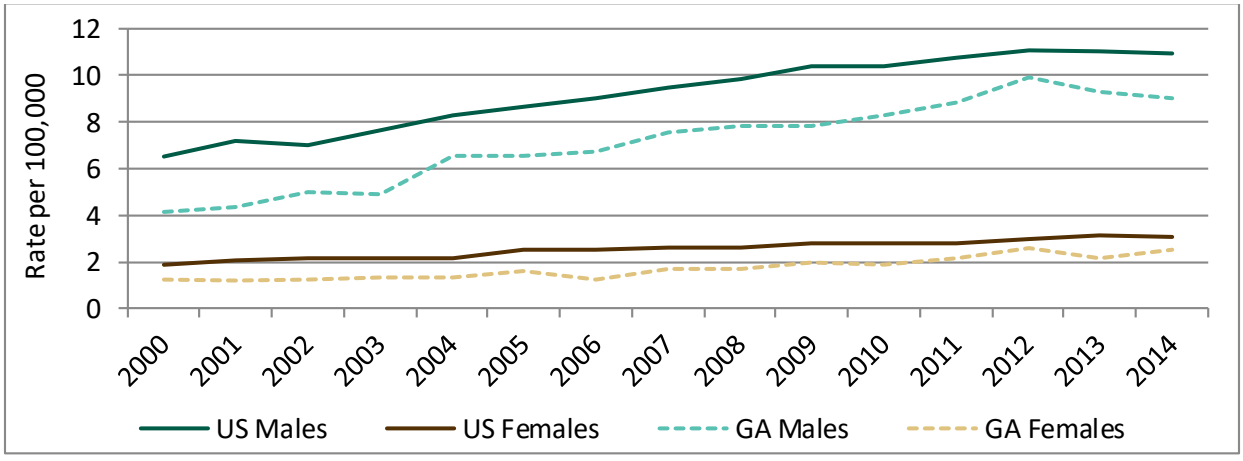


Source: SEER*Stat

*Rates not calculated where the count was less than sixteen.

Georgia incidence rates of HCC have remained lower than US rates among both males and females since 2000. Rates among both US and GA males increased significantly during the 2000s (5.2% per year and 6.9% per year respectively) but appear to have leveled off in more recent years. Among US and GA females, incidence rates are lower than those for males but have also been significantly increasing (3.5% per year for US females and 6.1% per year for GA females). (Figure 11.4) Data is not currently available to determine how many Georgia HCC cases are also infected with HBV and/or HCV.

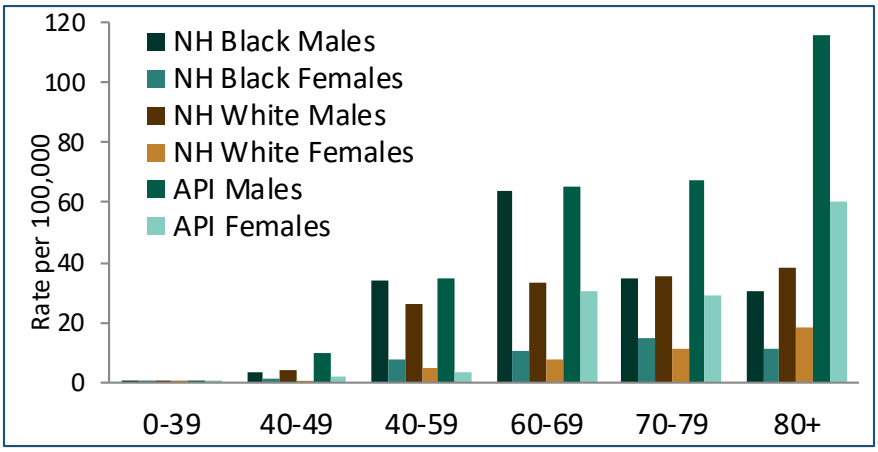
Figure 11.4 Trends in Hepatocellular Carcinoma Incidence Rates, Georgia and the United States, 2000-2014



Source: SEER*Stat

Incidence rates of liver cancer in Georgia are highest among males across all age groups and race/ethnicities. API males, especially those over the age of 60 years, have the highest rates of liver cancer. Liver cancer incidence is also high among API females over the age of 60 years, compared to NH black and NH white females. Liver cancer rates are also high among NH black males, especially those between the ages of 60 and 69. (Figure 11.5)

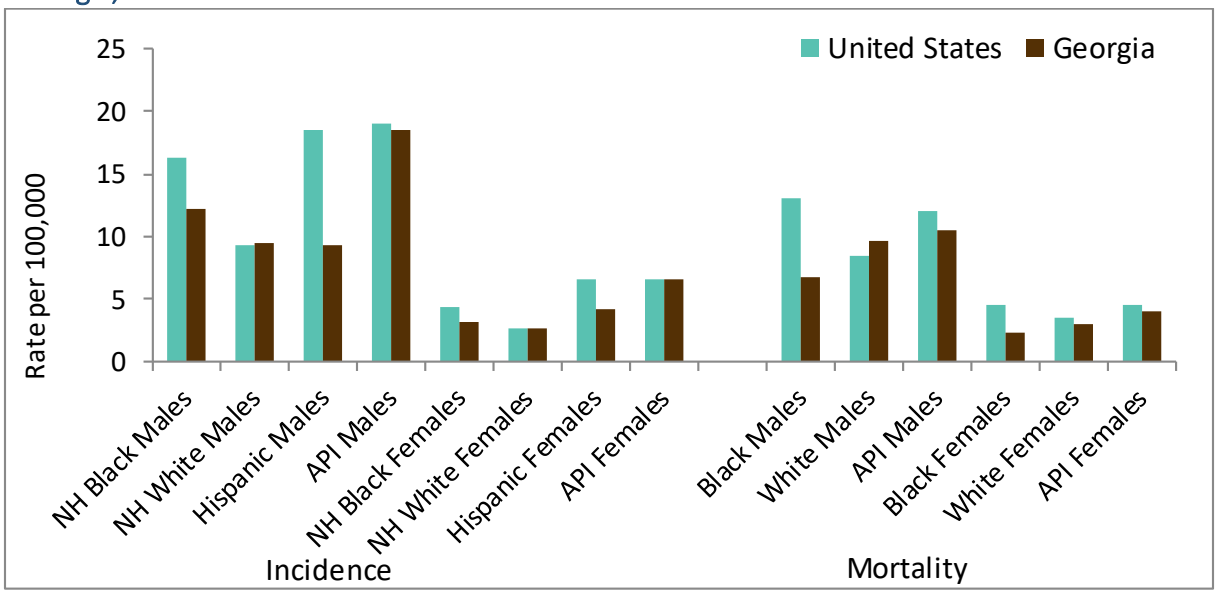
Figure 11.5: Liver Cancer Incidence Rates, by Age Group, Sex, and Race/Ethnicity, Georgia, 2010-2014



Source: Georgia DPH, GCCR, 2017

Compared to US rates, liver cancer incidence rates in Georgia are significantly lower among Black males and females and Hispanic males and females. However, rates in Georgia are consistent with the US for White males and females as well as API males and females. Liver cancer mortality rates are significantly lower among NH black males and females and NH white females in Georgia as compared to the US. Rates among NH white males are significantly higher in GA. (Figure 11.6)

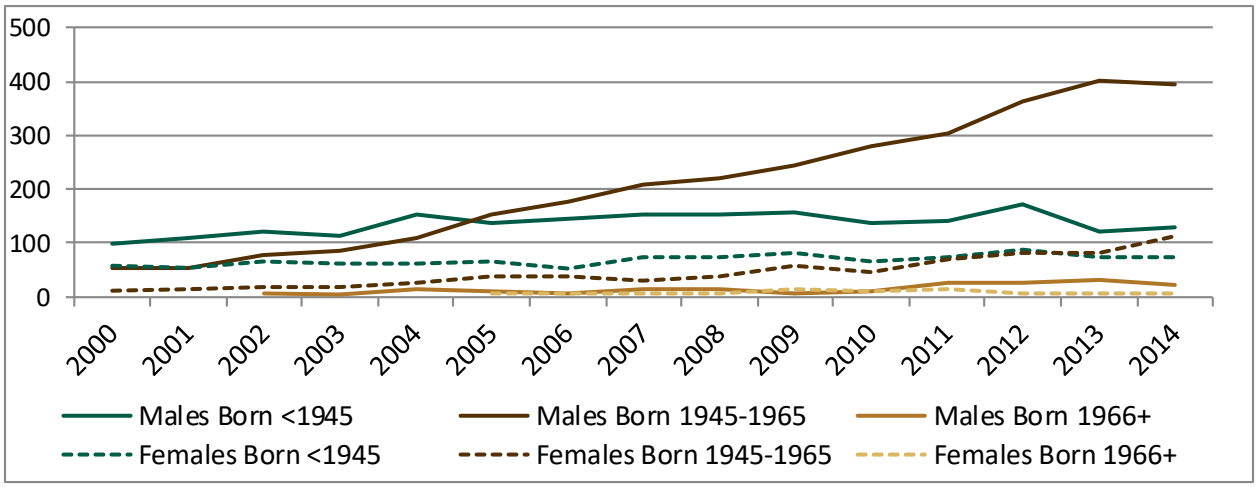
Figure 11.6: Liver Cancer Incidence and Mortality Rates, by Sex and Race/Ethnicity, US and Georgia, 2010-2014



Sources: Georgia Incidence: GCCR, 2017; US Incidence: SEER*Stat; Georgia Mortality: Georgia DPH, Office of Vital Statistics; US Mortality: CDC Wonder

Liver cancer rates generally increase with age, but this increase has been especially pronounced among people born between 1945 and 1965, otherwise known as "Baby Boomers". This generation experienced high rates of Hepatitis C during the 1960s through the 1980s before the virus was discovered and preventive measures became possible. In 2014, male Baby Boomers accounted for more than half of all new liver cancer cases in Georgia. (Figure 11.7)

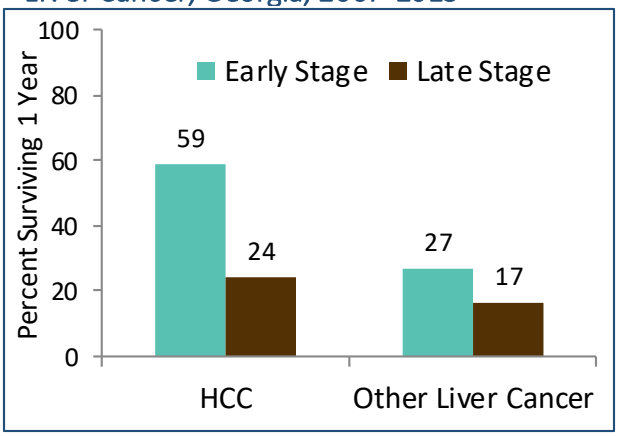
Figure 11.7: Frequency of Liver Cancer(all types) by Sex and Birth Cohort, Georgia, 2000-2014



Source: Georgia DPH, GCCR, 2017

Stage of disease refers to the extent to which cancer has spread when diagnosed. In general, the earlier the stage, the better the chance for survival. In Georgia, nearly half of all liver cancers are diagnosed at a late stage, regardless of sex, race, or tumor subtype. During the years 2007-2013, 59% of Georgians diagnosed with HCC at an early stage survived at least one year; that figure dropped to 24% for those diagnosed at a late stage. For Georgians diagnosed with other types of liver cancer during that same time period, 27% of early stage cases and 17% of late stage cases survived one year. (Figure 11.8)

Figure 11.8: One-Year Relative Survival by Histologic Subtype and Stage at Diagnosis, Liver Cancer, Georgia, 2007-2013



Source: Georgia DPH, GCCR, 2017

References:

[42] Ryerson AB, et al. Annual Report to the Nation on the Status of Cancer, 1975-2012, Featuring the Increasing Incidence of Liver Cancer. *Cancer*. May 1, 2016; 1312-1337.

[43] CDC, Fact Sheet. Viral Hepatitis and Liver Cancer. March 2016. https://www.cdc.gov/nchhstp/newsroom/docs/factsheets/viral-hep-liver-cancer.pdf.