

Alabama Head and Spinal Cord Injury Report

January 1, 2012 – December 31, 2012

Alabama Department of Public Health

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Background

According to the National Center for Health Statistics (NCHS), traumatic injuries are the leading cause of death among children and young adults. The Alabama Center for Health Statistics (ACHS) reports that, during the year 2012, accidental injury alone ranks fourth overall among causes of death in the state. Moreover, when the components of traumatic injury, i.e. accidental, suicide, and homicide, are added together, they represent the third leading cause of mortality in the state. In fact, traumatic injuries result in the loss of more potential years of life than any other cause.

The Alabama Department of Rehabilitation Services (ADRS) is charged with offering rehabilitation services to patients with moderate to severe brain, spinal cord, or other debilitating injury. At times, patients are unaware of, or have difficulty understanding, state supported rehabilitation services – the result of which leads to inadequate rehabilitation, disability management, and work force re-entry assistance. Patients who have sustained debilitating injuries are identified and linked with ADRS via the Alabama Head and Spinal Cord Injury Registry (AHSCIR), a registry mandated by Alabama Act 98-611. This law, which requires all hospitals in Alabama to submit data related to head and/or spinal cord injury cases to the Alabama Department of Public Health (ADPH), was passed in May of 1998. The Alabama Trauma Registry (ATR), established shortly after AHSCIR data collection began in 1999, strives to broaden collection efforts to include data related to all types of trauma. Since the trauma registry program began providing data to the ADRS in the year 2000, patients with moderate to severe traumatic brain injury and/or spinal cord injury have been identified and contacted. Detailed analysis of 2012 data submitted to the ATR is ongoing since new cases from 2012 are still being submitted. However, enough data is contained in the ATR to perform a preliminary analysis of 2012 cases. Those requesting services have been provided appropriate, need-based, referral information.

More specifically, development of the ATR component pertains to an expansion of the head and spinal cord injury registry into a larger, more comprehensive program. Trauma registry personnel in the Office of Emergency Medical Services (EMS) of the ADPH collect statewide data by working with hospitals at all levels of trauma care (acute and ancillary). The ATR is beginning to capture data that will allow for more accurate evaluations regarding traumatic injury incidence and patterns. Data are received from hospitals that devote significant resources to trauma care as well as those hospitals that function to treat less severe traumatic injuries but stabilize and transfer more severe traumatic injuries. Ultimately, registry data analysis and injury pattern evaluations will permit researchers and policy makers to identify better ways of reducing injury mortality and morbidity in Alabama.

It is important to provide the public with mortality and morbidity statistics associated with motor vehicle crashes in order to accurately illustrate the impact injuries have on individuals, families, and society. Additionally, the information assists with efforts related to increasing protective equipment usage rates. Trauma registry data are used by a variety of organizations. Emergency management agencies and emergency medical service providers use the registry information for community trauma prevention

education. As previously described, the state department of rehabilitation services uses the AHSCIR data to locate patients suffering from head and/or spinal cord injuries in an effort to make them aware of state supported services and perform follow-up treatment.

Historically, the *Alabama Traffic Injury Registry (ATIR)*, which collected data from 1991 through 1998 from 18 hospital emergency departments, was able to generate and convey similar information; however, due to the small sample size and other limitations, it was not possible to draw broad conclusions with respect to statewide mortality and morbidity. *ATIR* data collection was labor intensive, required frequent travel to hospital emergency departments and was unable to capture all trauma cases treated at the 18 participating hospitals. The demographic characteristics of patients treated at hospitals from which the *ATIR* collected data were, simply put, not representative of the state as a whole. Therefore, it was not possible to accurately assess the extent of disparity in Glasgow Coma Scale (GCS) scores, the Abbreviated Injury Scale (AIS) scores, Injury Severity Scores (ISS), and functional ability at discharge of persons whose injuries were severe enough for admittance to the hospital and among different segments of Alabama's population. For obvious reasons, if hospital participation for the general trauma registry (ATR) is broad enough, more representative samples will be available which, in turn, will allow for more accurate information regarding statewide injury – especially motor vehicle crash related injury.

The Alabama Statewide Cancer Registry (ASCR), located in the Bureau of Family Health Services, has provided the ATR/AHSCIR staff with a successful example regarding registry operation and management. Collaboration between the ATR/AHSCIR and cancer registry staff has contributed greatly to the development and operation of the trauma registry program. Also, the ATR/AHSCIR staff has consulted with the staffs and web sites of other successful state registries. The ATR/AHSCIR has been modeled after these successful programs and proposes, in cooperation with a statewide emergency response program, to establish one of the most comprehensive trauma surveillance systems in the country.

Methods

The case definition for inclusion in the ATR program denotes any patient with at least one injury ICD-9-CM diagnosis code between 800.00 and 959.9, excluding 905–909 (late effects of injury), 910-924 (blisters, contusions, abrasions, and insect bites), and 930-939 (foreign bodies). The patient must also have been admitted to the hospital for at least 24 hours, transferred into and/or out of the hospital, or died after receiving any evaluation or treatment at the hospital or were dead upon arrival. Reportable diagnoses for the AHSCIR include all confirmed cases of head and spinal cord injury with at least one of the following ICD-9-CM diagnoses:

800.0 --801.9	Fracture of the vault or base of the skull
803.0 – 804.9	Other and unqualified and multiple fractures of the skull
850.0 – 854.1	Intracranial injury, including concussion, contusion, laceration
806.0 – 806.9	Fracture of vertebral column with spinal cord lesion
950.1 – 950.3	Injury to the optic chiasm, optic pathways, and visual cortex
952.0 – 952.9	Spinal cord lesion without evidence of spinal bone injury
959.01	Head Injury, unspecified
995.55	Shaken infant syndrome

Data Use and Comparability

All data contained in this report must be interpreted with careful judgment. It is important to note that the information presented in this report is based on data from the ATR which were submitted as of September 30, 2012. The data in this report is not comparable to state or federal data from other sources due to variations in collection and analytical techniques.

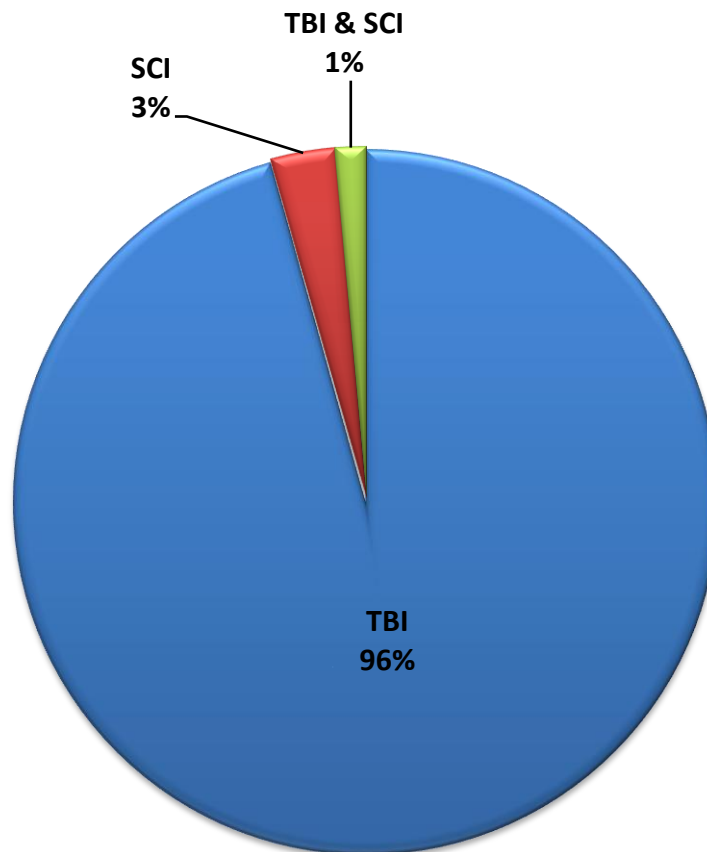
Changes in reporting requirements by the U.S. Census Bureau have affected 2012 traumatic head and spinal cord injury totals for Hispanics. As a consequence, some ATR/AHSCIR reporting institutions characterize “Hispanic” as a race and others characterize it as an ethnic group. These changes affect the accuracy of our head and spinal cord injury profile for Hispanics. Adjustments to data collection procedures for traumatic injury data that will limit the impact of this inconsistency on future reports are being considered by registry staff at this time

Less severe head and spinal cord injuries are under-represented in this analysis by design. Consequently, some less severe injuries are not included in the AHSCIR case definition thereby permitting registrars to omit reporting them. Additionally, mortality may be under-estimated because of cases in which persons expired at the scene and bypassed hospitals. The statistical significance of the summary data for the SCI and combined TBI/SCI cases is also limited by the small population size regarding some respective data subgroups. Cases admitted to a given hospital and then transferred to another hospital during the course of their treatment are counted twice in this report.

RESULTS

The ATR received reports of 5,160 head and spinal cord injury cases that were admitted to Alabama hospitals during calendar year 2012. Head injuries (TBI) constituted 96 percent (n =4,936) of the reported cases and spinal cord injuries (SCI) constituted three percent (n =154). There were 70 cases (one percent) in the registry that had both head and spinal cord injuries. This document will use the term traumatic brain injury (TBI) when referring to head injuries. Separate analyses are presented for each of the three categories.

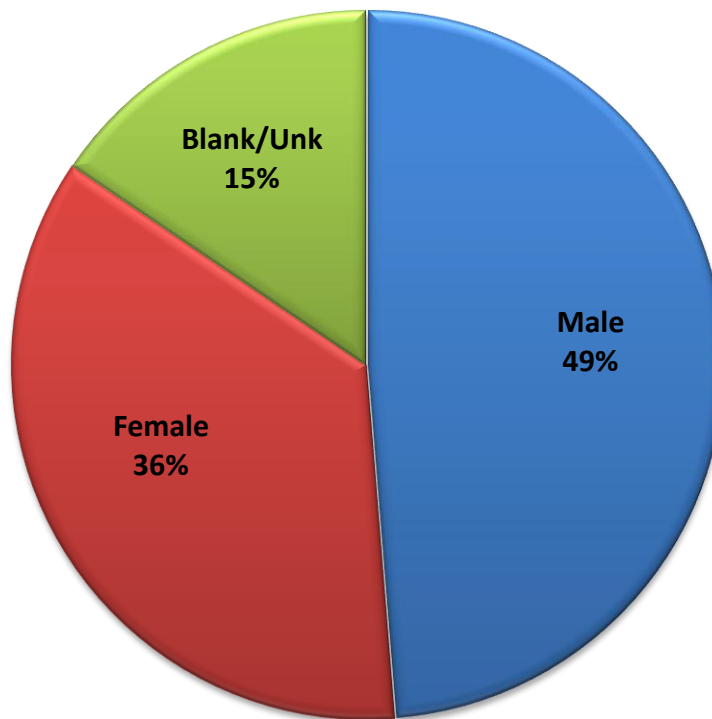
Figure 1
Type of Injury
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(N = 5,160)



Population size of each category will be noted in the caption for each graphic illustration.

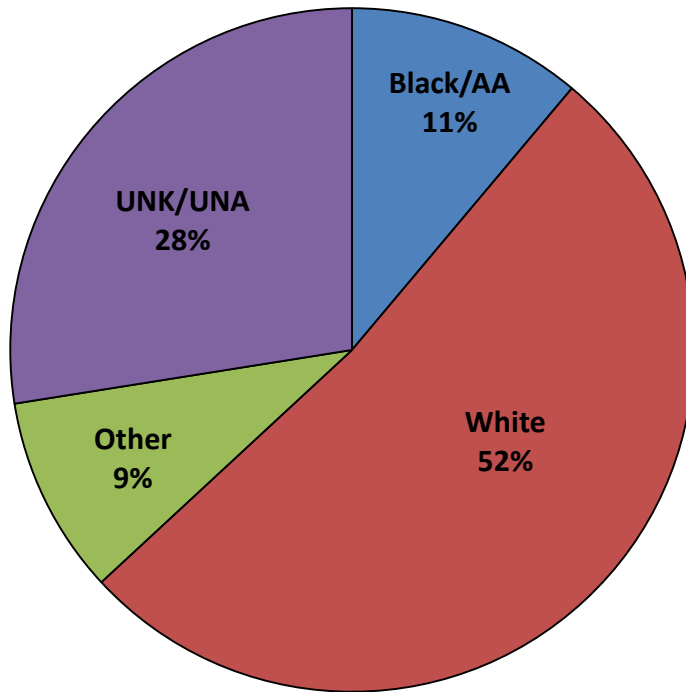
Traumatic Brain Injury

Figure 2
Proportion of TBI Cases by Gender
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n=4,936)



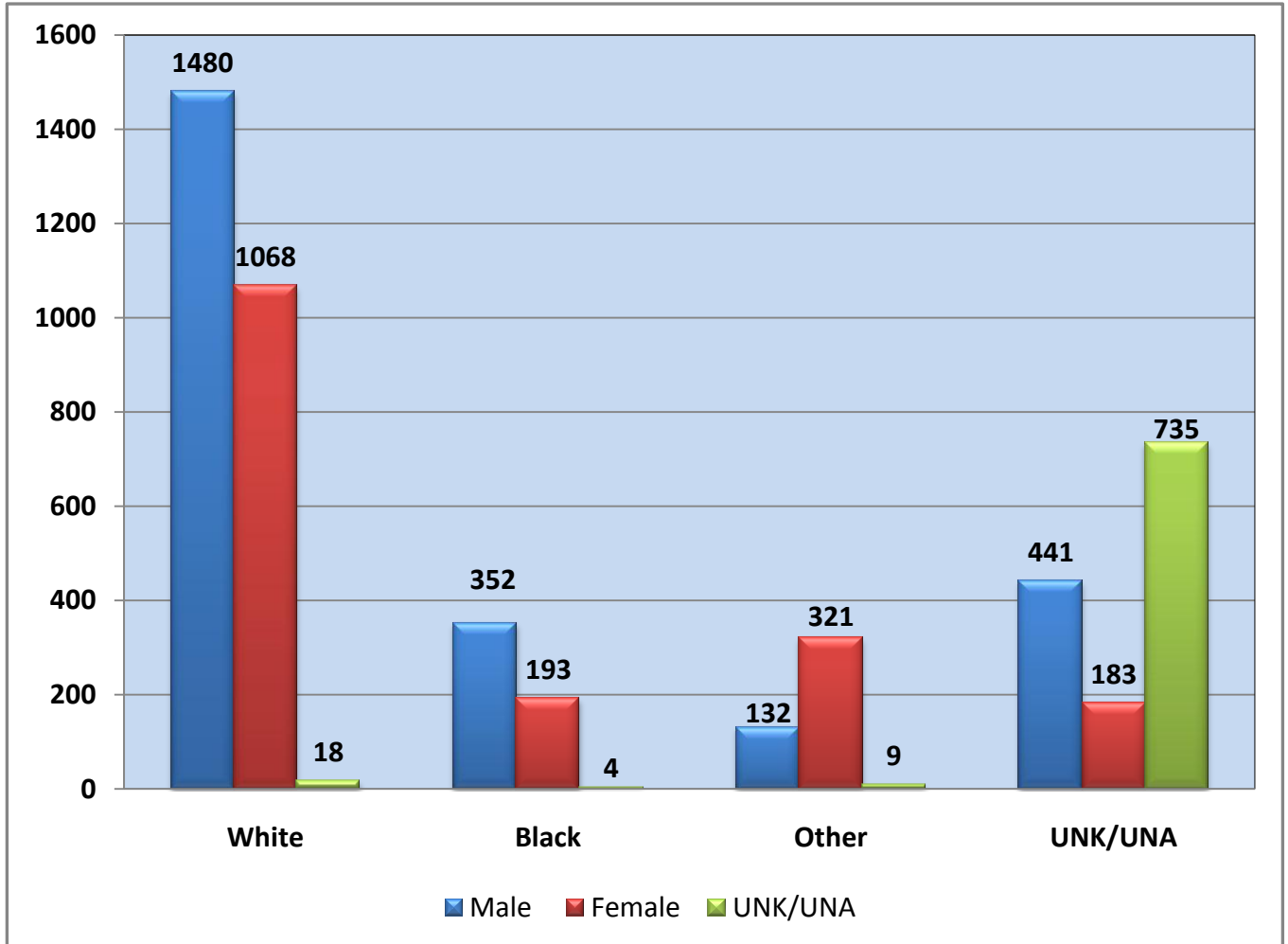
There were 1.4 times more male TBI cases (n = 2,405) than female cases (n =1,765) reported to the AHSCIR for calendar year 2012. In 15 percent of the total cases (766), gender information was missing or unknown.

Figure 3
Proportion of TBI Cases by Race
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2012– December 31, 2012
(n=4,936)



Whites constitute 52 percent (n = 2,566) of the cases, Blacks/African Americans 11 percent (n = 549), other race 9 percent (n = 462), and in 28 percent of the reported cases (n = 1,359) race information was unknown or unavailable at the time of this report.

Figure 4
Number of TBI Cases by Gender & Race
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 4,936)



Fifty-eight percent (n=1,480) of TBI cases in whites were male, sixty-four percent (n = 352) of Black/African-American cases were male, and twenty-nine percent (n = 132) of “Others” were male. This category includes those of Asian, American Indian, and Hispanic descent. The overall percentages in this injury type were forty-nine percent male, thirty-six percent female, and fifteen percent unknown or the data was not available. (See Figure 2).

Table 1
2012 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 4,936)

Age	White Male	White Female	Black Male	Black Female	Other Male	Other Female	No Data	Total	% Total
<5	48	51	19	29	9	16	94	266	5.4%
5 - 14	137	74	40	14	11	21	113	410	8.3%
15-24	303	137	82	40	26	81	165	834	16.9%
25-34	179	100	62	21	17	57	75	511	10.4%
35-44	128	78	22	30	18	35	70	381	7.7%
45-54	156	77	63	15	9	42	55	417	8.4%
55-64	161	97	39	9	17	27	66	416	8.4%
65-74	123	106	12	6	9	18	55	329	6.7%
75-84	172	195	10	14	8	15	37	451	9.1%
>84	68	147	3	15	8	7	25	273	5.5%
No Data	5	6	0	0	0	2	635	648	13.1%
Total	1,480	1,068	352	193	132	321	1,390	4,936	100%
% Total	30.0%	21.6%	7.1%	3.9%	2.7%	6.5%	28.2%	100.0%	

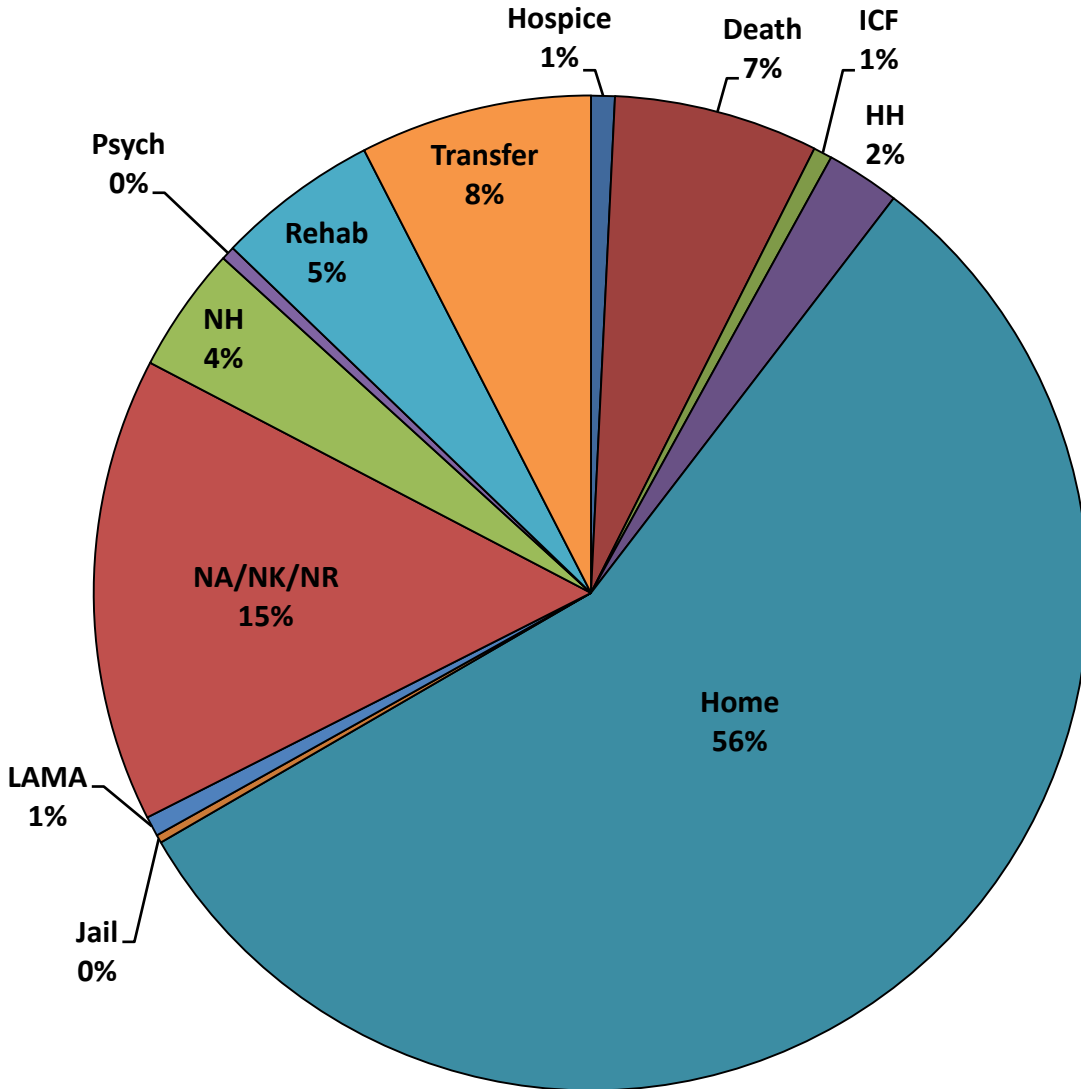
The 15-24 year old age group sustained the largest percentage of TBI cases both in 2011, with 19.4 percent (n = 1,111), and in 2012, with 16.9 percent (n = 834). In 2012, the race or gender of 635 TBI cases was not available. There were 13 cases where the age was unavailable. The “Other” category in the data includes Asians, Hispanics, and others.

Table 2
2011 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2011 – December 31, 2011
 (n = 5,719)

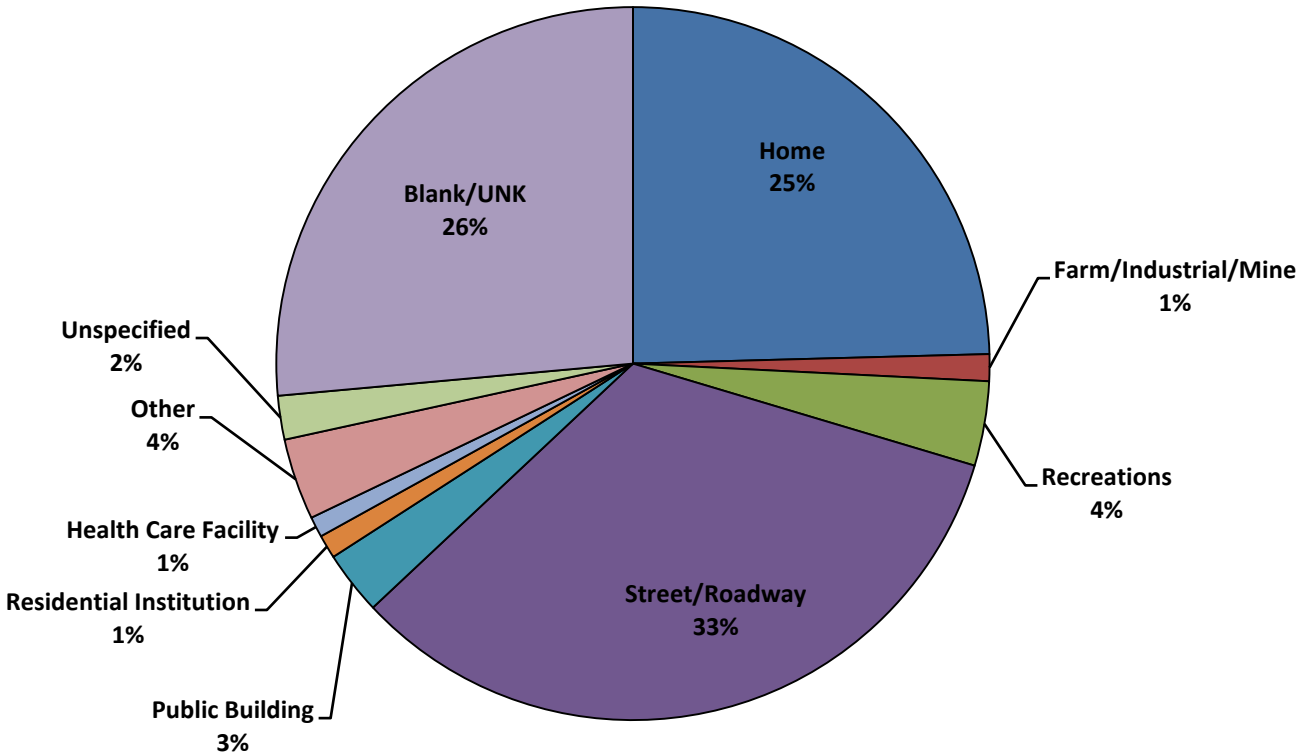
Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	70	54	53	21	3	6	207	3.6%
5-14	133	87	50	24	15	5	314	5.5%
15-24	541	247	181	90	42	10	1,111	19.4%
25-34	408	201	145	53	48	14	869	15.2%
35-44	341	131	96	49	13	4	634	11.1%
45-54	391	162	107	39	12	8	719	12.6%
55-64	346	153	72	32	7	3	613	10.7%
65-74	190	168	27	22	3	5	415	7.3%
75-84	210	274	14	17	6	6	527	9.2%
>84	114	181	5	10	0	0	310	5.4%
Total	2,744	1,658	750	357	149	61	5,719	100%
% Total	48.0%	29.0%	13.1%	6.2%	2.6%	1.1%	100%	

Figure 5
Discharge Disposition Following TBI Cases
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 4,936)



The greatest portion, fifty-six (n = 2,775), were discharged home. From the data it cannot be determined how many of these were referred to outpatient rehab facilities. A significant amount of discharge disposition data (n=746) was not available, not known, or not recorded. (LAMA=left against medical advice, NH= nursing home, ICF = immediate care facility, HH= home health).

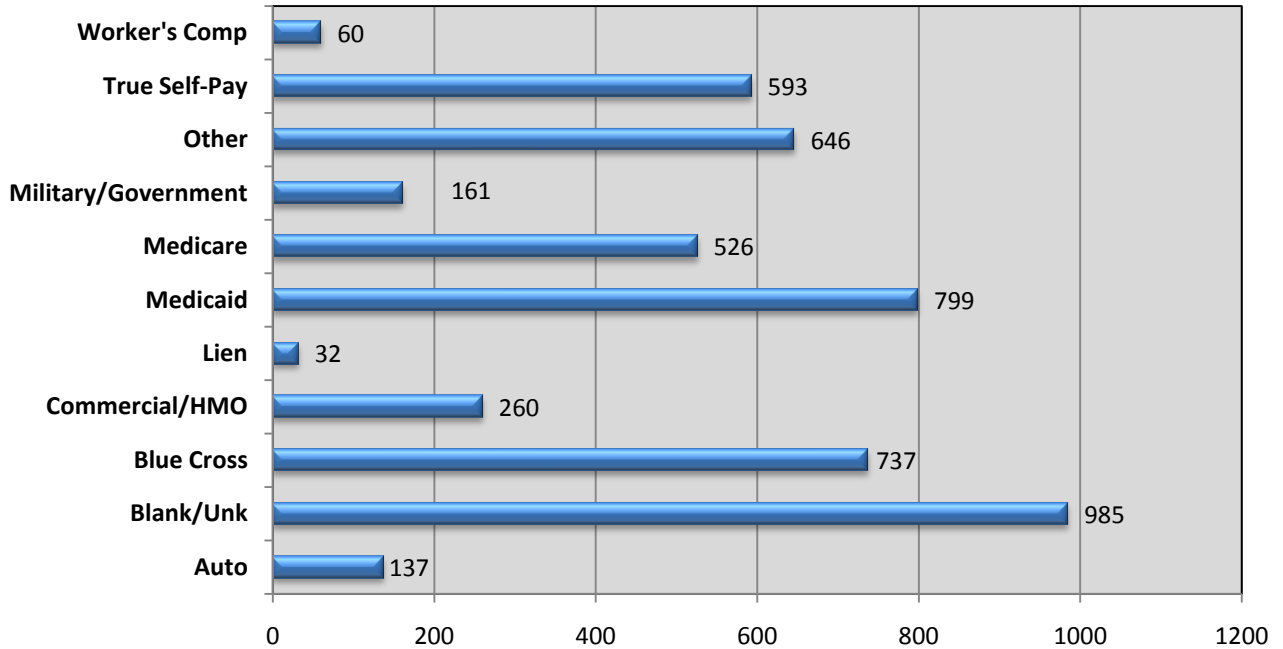
Figure 6
Site of Injury Occurrence in TBI Cases
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 4,936)



Most traumatic brain injuries, thirty-three percent (n = 1,648), reported to the AHSCIR occurred on roads, streets and highways; twenty-five percent (n = 1,213) occurred in the home. While only two percent (n=98) reported an unspecified site of injury occurrence, twenty-six percent (n = 1,305) of data was unreported or unknown for TBI.

Figure 7
Payer Source for TBI Cases

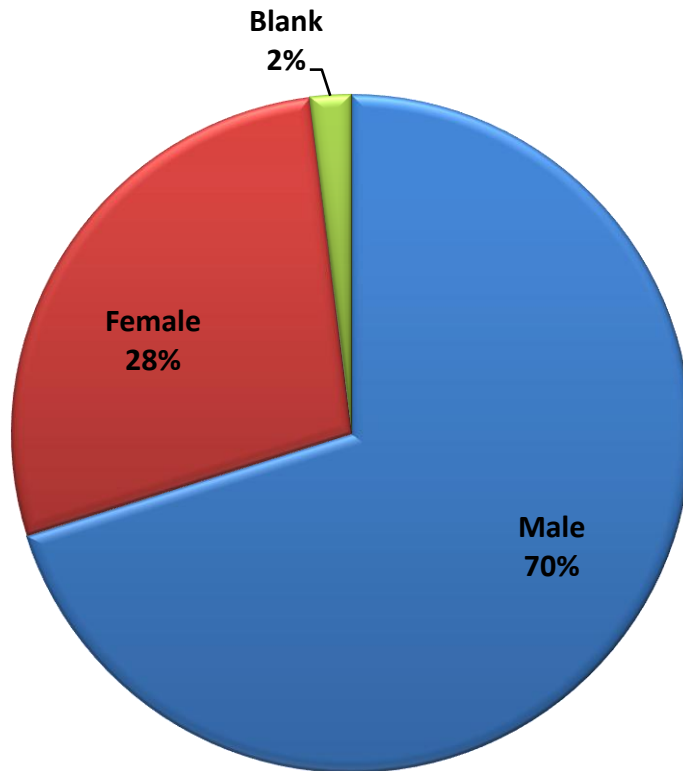
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 4,936)



Individuals paid for their own care in twelve percent (n = 593) of cases according to information sent to the AHSCIR. Fifteen percent (n = 737) were paid for by various Blue Cross/Blue Shield plans. Medicare and Medicaid paid in eleven percent (n = 526) and sixteen percent (n = 799), respectively. Various commercial insurance companies and health maintenance organizations (HMOs) were primary payers in five percent (n = 260) of TBI cases reported to the registry. Military and other government insurance plans paid in three percent (n = 161), workman’s compensation was the primary payer in one percent (n = 60), and hospital liens were held in one percent (n = 32). Payment source was indicated as “Other” in thirteen percent (n =646) of these cases. The source of payment data sent to the AHSCIR is subject to misclassification for various reasons, e.g. the Self Pay group might include Liens in some cases or the primary payment source may not be properly submitted when there are multiple sources of payment.

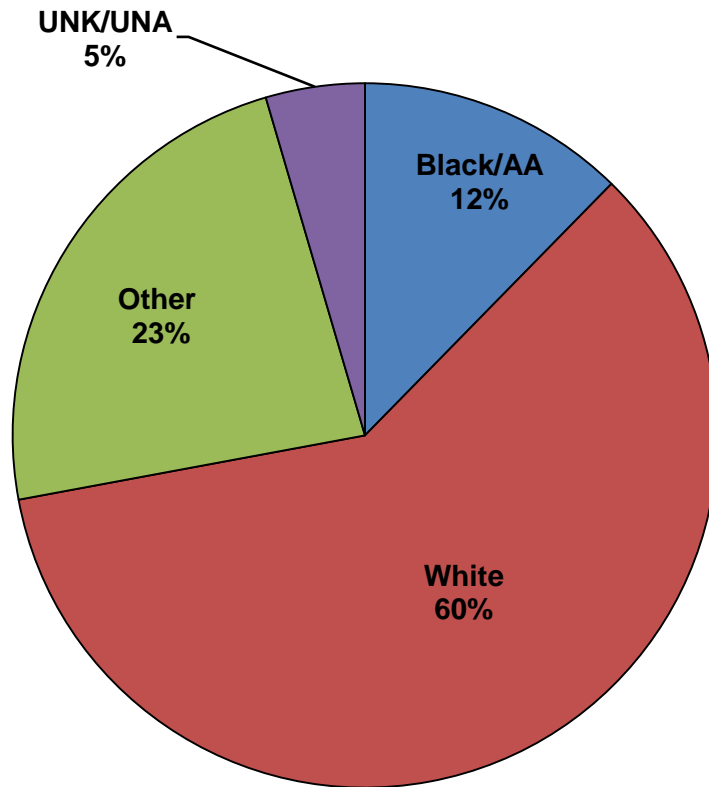
Spinal Cord Injury

Figure 8
Proportion of SCI Cases by Gender
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 154)



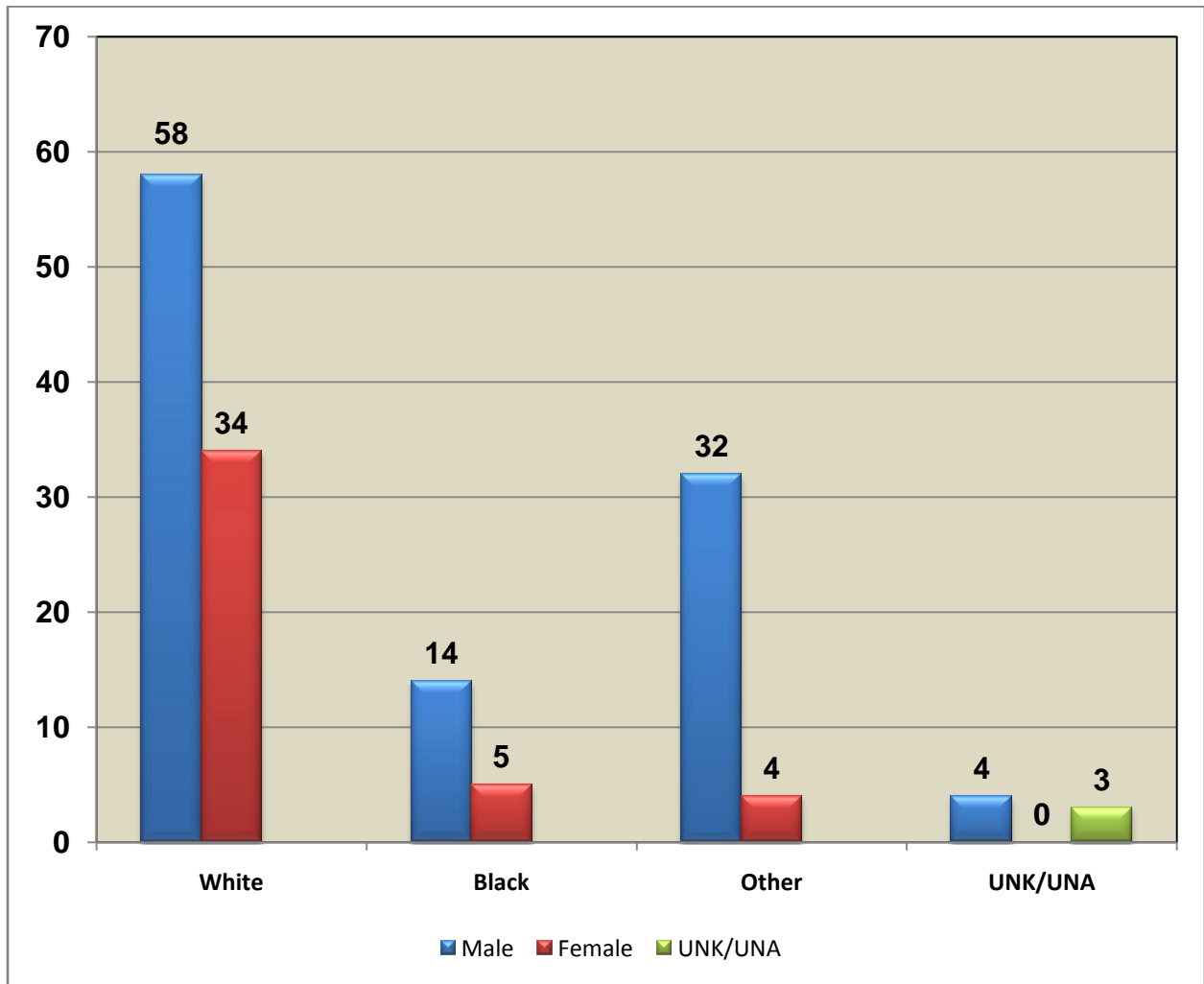
There were 2.5 times more male SCI cases (n = 108) than female cases (n = 43) reported to the Alabama Head and Spinal Cord Injury Registry for calendar year 2012. In three percent (n=3) of the cases gender was not reported.

Figure 9
Proportion of SCI Cases by Race
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 154)



Whites constituted 60 percent (n = 92) of the SCI cases, Blacks/African-Americans 12 percent (n = 19), and other 23 percent (n = 36) in calendar year 2012. In five percent (n=7) of the 2012 cases race was unknown or unavailable.

Figure 10
Number of SCI Cases by Race and Gender
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 154)



Seventy-two percent (n = 58) of SCI cases in Whites were male and forty-seven percent (n = 14) in Blacks/African-Americans were male. The overall percentages in this injury type were 70 percent male and 28 percent female (see Figure 8).

Table 3
2012 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 154)

Age	White Male	White Female	Black Male	Black Female	Other Male	Other Female	No Data	Total	% Total
<5	0	0	0	0	0	0	0	0	0.0%
5-14	1	2	0	0	0	0	0	3	1.9%
15-24	6	11	2	1	9	1	0	30	19.5%
25-34	8	0	1	0	6	2	2	19	12.3%
35-44	11	2	-2	1	4	0	1	17	11.0%
45-54	12	1	3	0	11	0	1	28	18.2%
55-64	10	1	6	3	1	1	0	22	14.3%
65-74	4	7	2	0	0	0	0	13	8.4%
75-84	3	10	2	0	0	0	0	15	9.7%
>84	3	0	0	0	1	0	0	4	2.6%
No Data	0	0	0	0	0	0	3	3	1.9%
Total	58	34	14	5	32	4	7	154	100%
% Total	37.7%	22.1%	9.1%	3.2%	20.8%	2.6%	4.5%	100%	

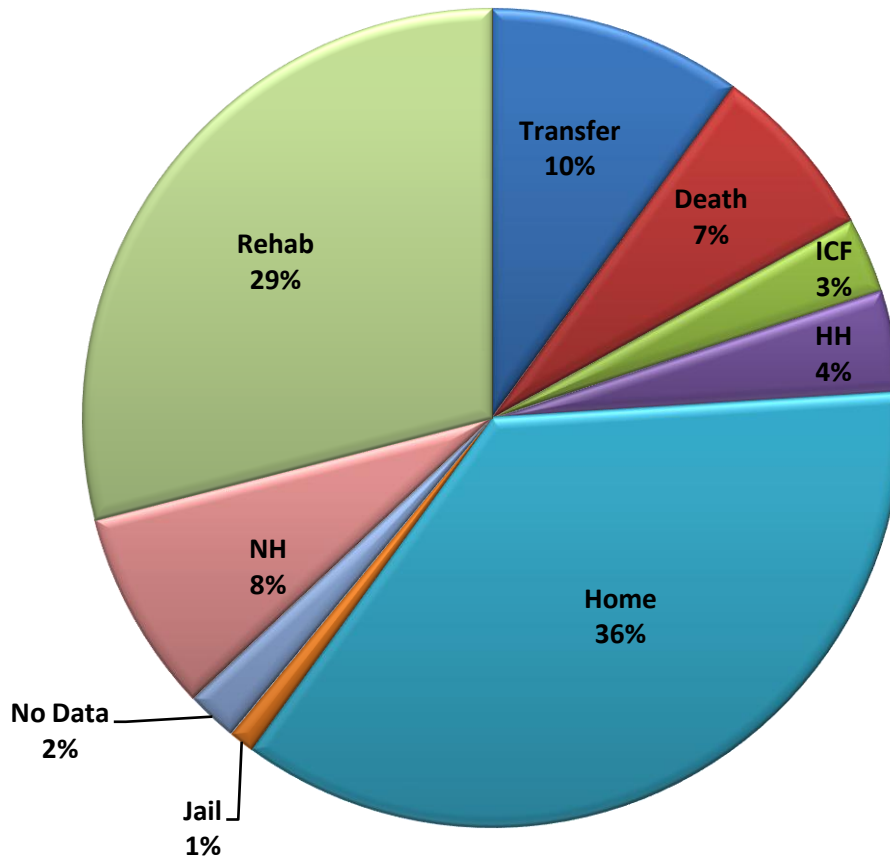
Table 4
2011 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2011 – December 31, 2011
 (n = 228)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	0	1	0	0	0	0	1	0.4%
5-14	1	1	0	0	0	0	2	0.9%
15-24	30	11	17	4	0	0	62	27.2%
25-34	16	3	7	5	1	0	32	14.0%
35-44	12	7	8	2	0	0	29	12.7%
45-54	12	7	14	1	1	0	35	15.4%
55-64	14	6	4	1	0	0	25	11.0%
65-74	19	4	0	1	0	0	24	10.5%
75-84	7	0	1	0	0	0	8	3.5%
>84	3	6	1	0	0	0	10	4.4%
Total	114	46	52	14	2	0	228	100%
% Total	50.0%	20.2%	22.8%	6.1%	0.9%	0.0%	100%	

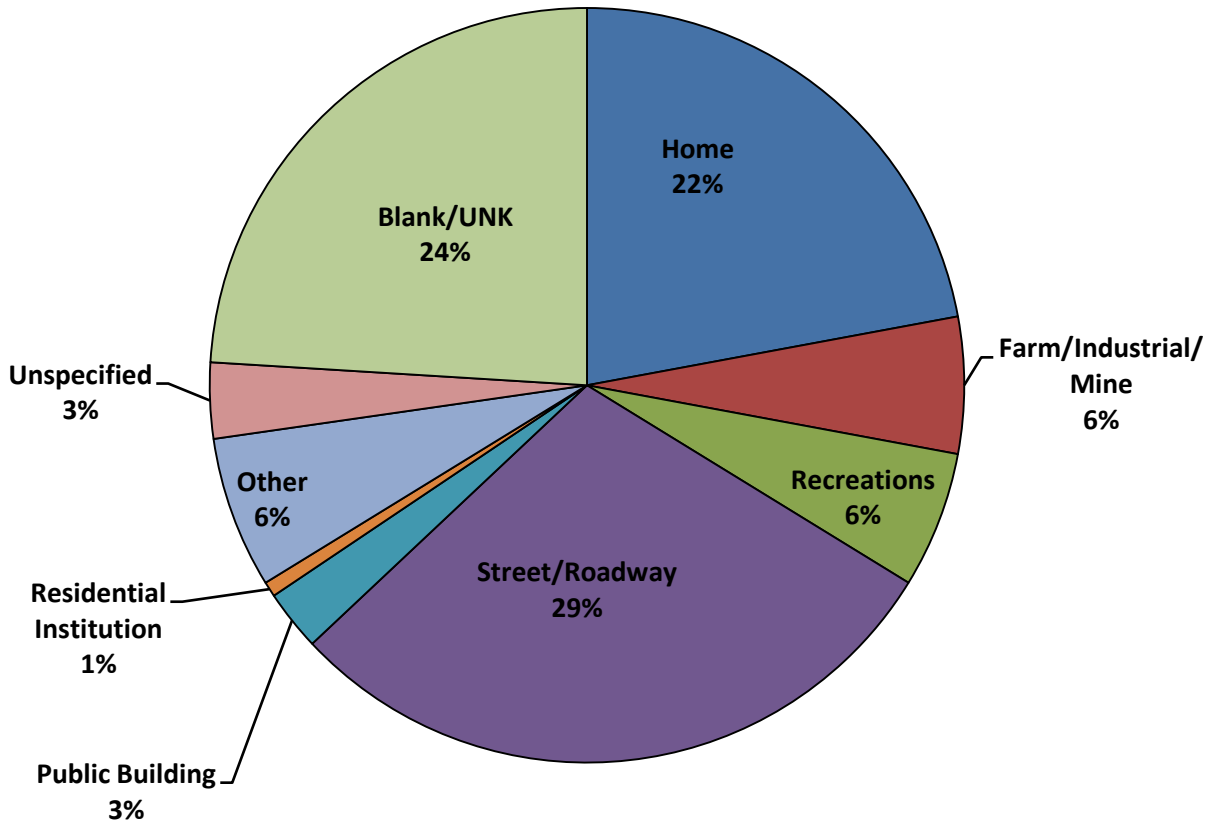
Figure 11
Discharge Disposition Following SCI Cases

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 154)



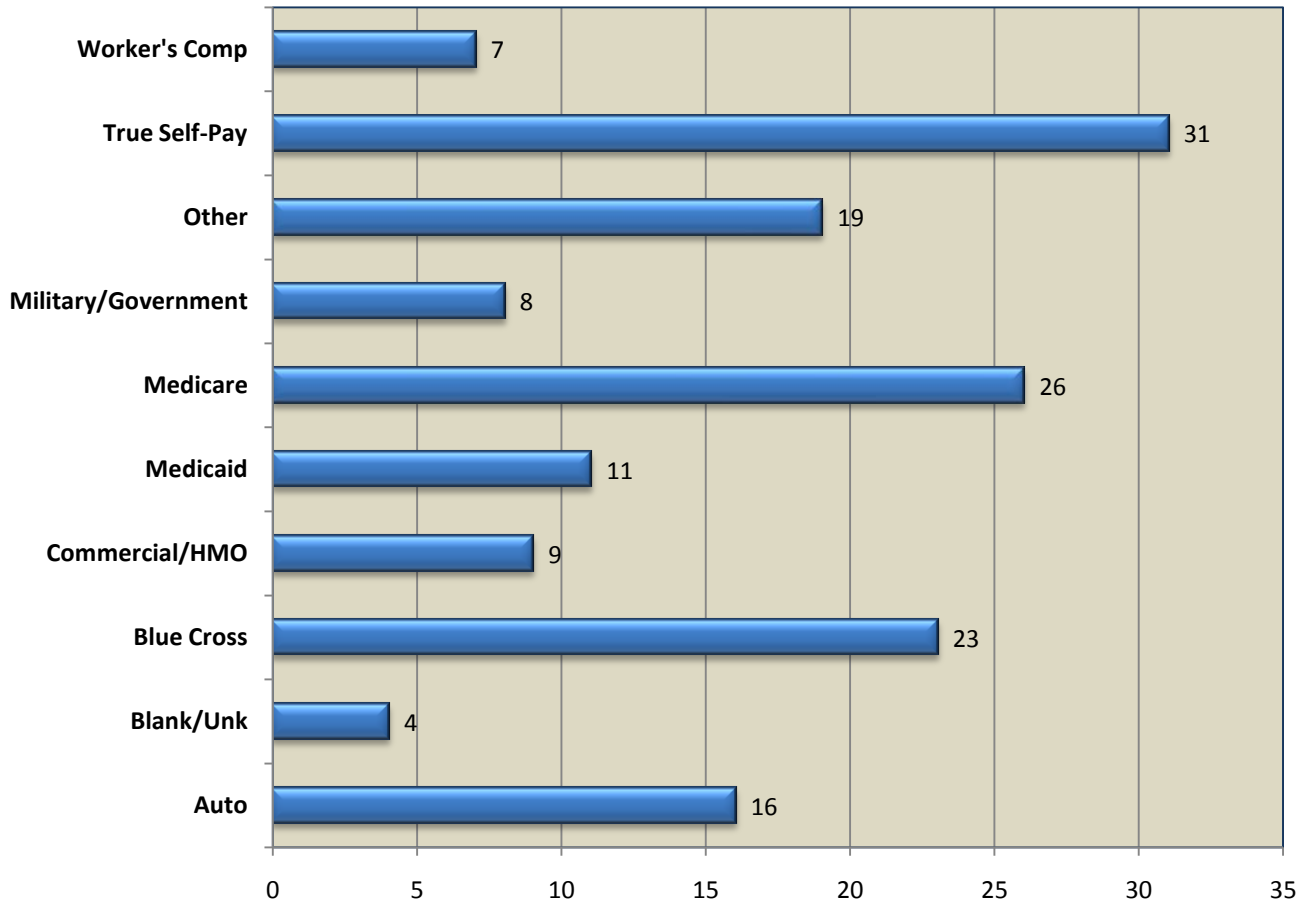
Twenty-eight percent (n = 45) of SCI cases went to residential rehabilitation facilities and eight percent (n = 12) went to nursing homes (NH) after discharge. Thirty-six percent (n = 55) were discharged home without any home health services. Four percent (n = 6) were referred to home health services. Three percent (n = 5) were transferred to immediate care facilities (ICF). Seven percent (n = 11) of SCI cases expired. There were four cases in which the discharge disposition was not noted.

Figure 12
Site of Injury Occurrence in SCI Cases
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n =154)



Most spinal cord injuries reported occurred on roadways, 29 percent (n=45) or in private residences, 22 percent each (n = 34). In 24 percent of the cases data on site of injury occurrence was either unknown or left blank.

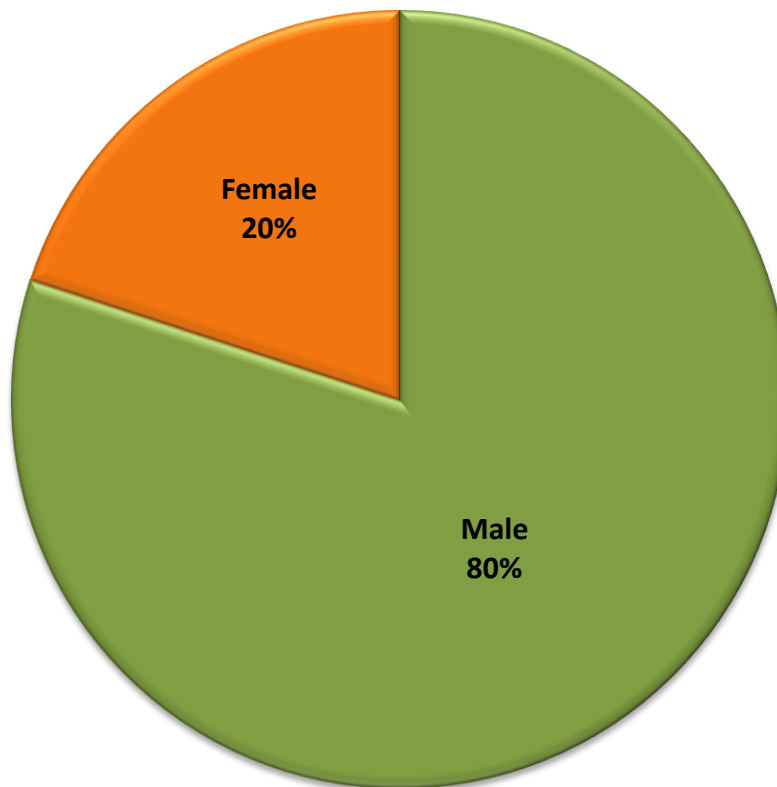
Figure 13
Payer Source for SCI Cases
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 154)



Individuals paid for their own care in 20 percent (n = 31) of cases according to information sent to the AHSCIR. Fifteen percent (n = 23) were paid for by various Blue Cross/Blue Shield plans. Medicare and Medicaid paid 17 percent (n = 26) and 7 percent (n = 11), respectively. Various commercial insurance companies and health maintenance organizations (HMOs) were primary payers in six percent (n = 9) of SCI cases reported to the registry. Military and other government insurance plans paid in five percent (n = 8), and workman's compensation was the primary payer in five percent (n = 7). Payment source was indicated as "Other" in 12 percent (n = 19) of these cases. The source of payment data sent to the AHSCIR is subject to misclassification for various reasons, e.g. the Self Pay group might include Liens in some cases or the primary payment source may not be properly submitted when there are multiple sources of payment.

Cases with Both Head and Spinal Cord Injuries

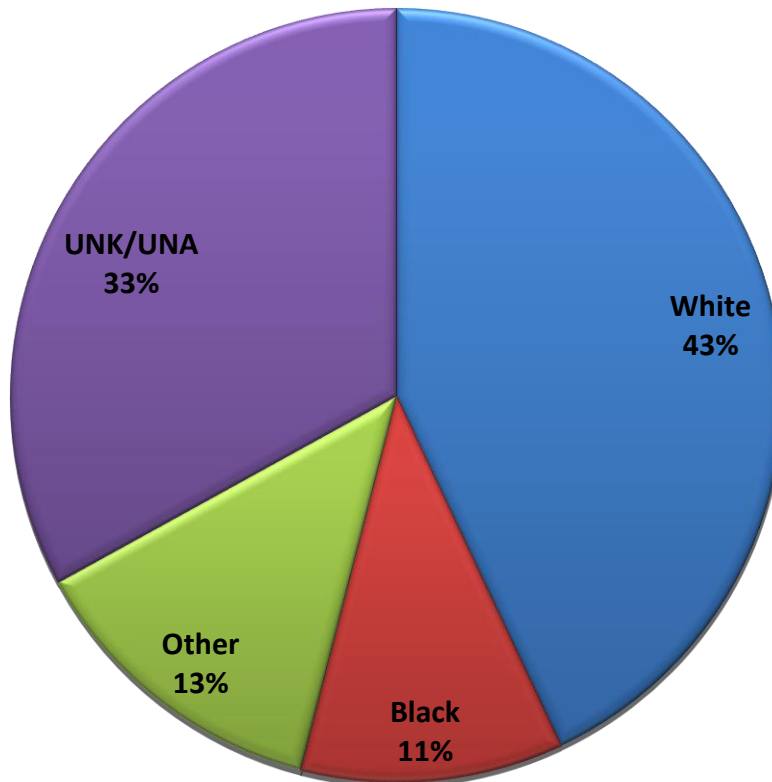
Figure 14
**Proportion of Cases with Both Traumatic Brain
and Spinal Cord Injuries by Gender**
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 70)



There were four times more male TBI and SCI cases (n = 56) than female cases (n = 14) reported to the AHSCIR for calendar year 2012.

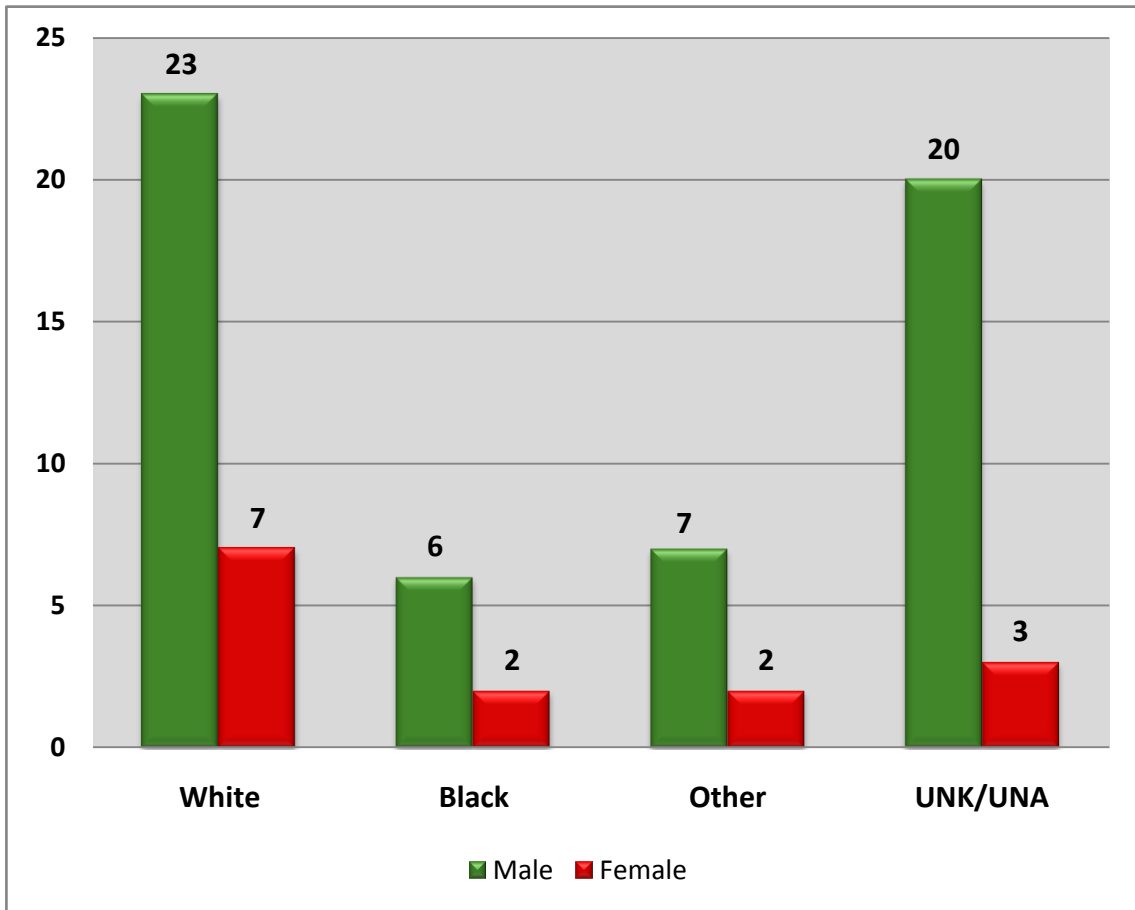
Figure 15
**Proportion of Cases with Both Traumatic Brain
and Spinal Cord Injuries by Race**

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 70)



Whites constituted 63 percent (n = 44) of the SCI cases, Blacks/African-Americans 21 percent (n = 15), and other represented 16 percent (n = 11) in calendar year 2012.

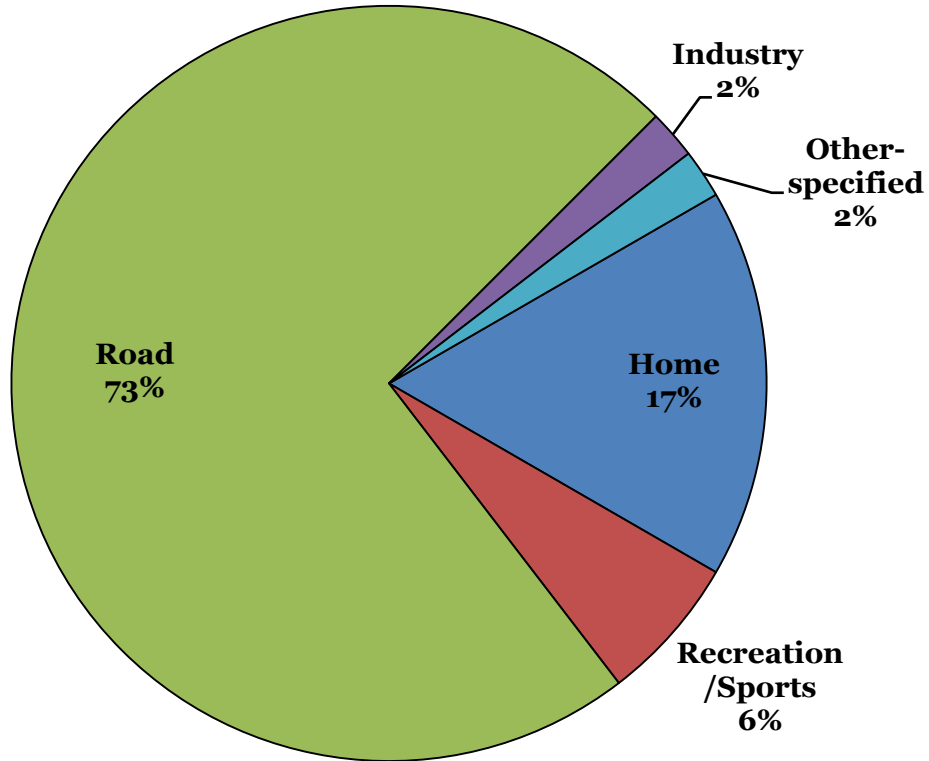
Figure 16
**Number of Cases with Both TBI
 and SCI by Gender and Race**
 Alabama Head and Spinal Cord Injury Registry (AHSCIR)
 January 1, 2012 – December 31, 2012
 (n = 70)



Seventy-five percent (n = 55) of cases with both head and spinal cord injuries in whites were male, eighty-four percent (n =) in Blacks were male, and two of the four cases in the Other category were male. The overall gender percentages in this injury type were 76 percent male and 24 percent female.

Figure 17
**Site of Injury Occurrence in Cases
with Both TBI and SCI**

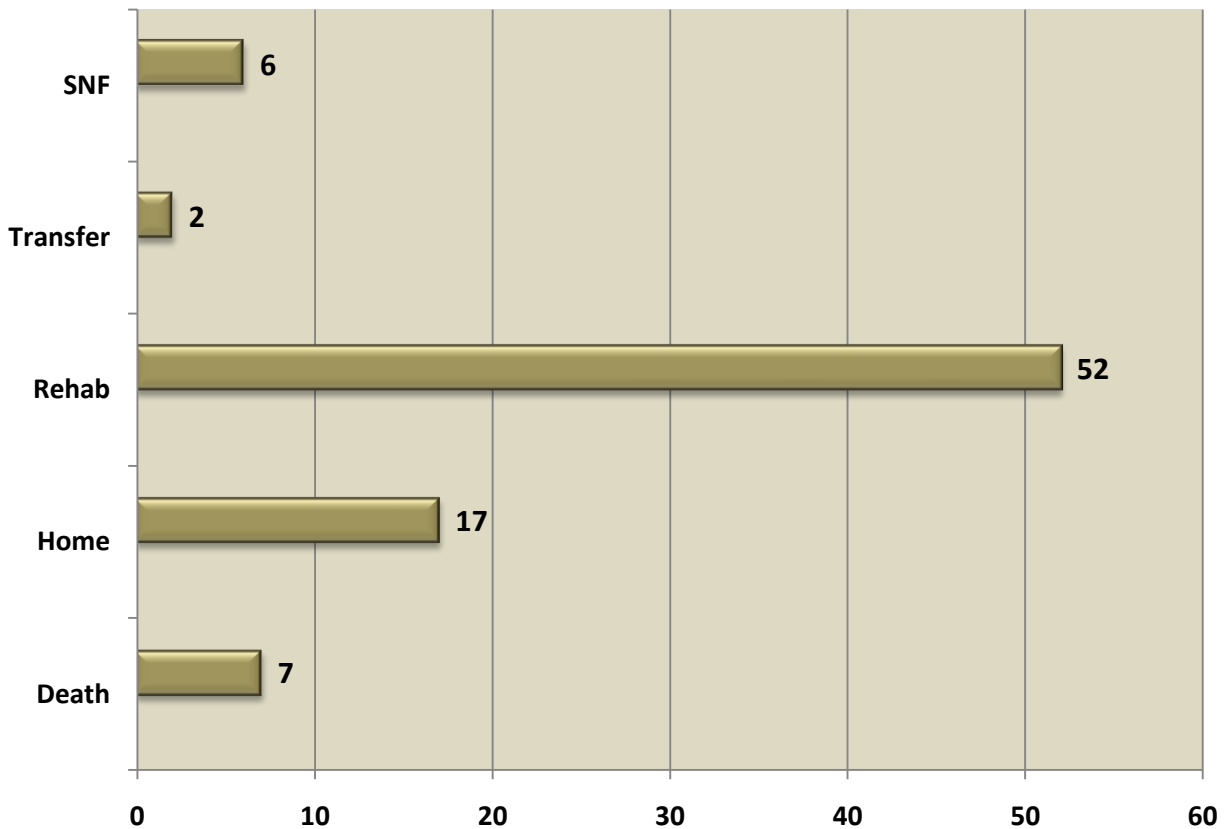
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 96)



Seventy-three percent (n = 70) of ATR cases that had both TBI and SCI occurred on roadways. Seventeen percent (n = 16) occurred in the home. Two percent (n = 2) occurred in industrial settings. Six percent (n = 6) occurred in sites for sports and recreation. The remaining two percent of cases occurred other, non-categorized sites (n = 2).

Figure 18
**Discharge Disposition Following Cases
with Both TBI and SCI**

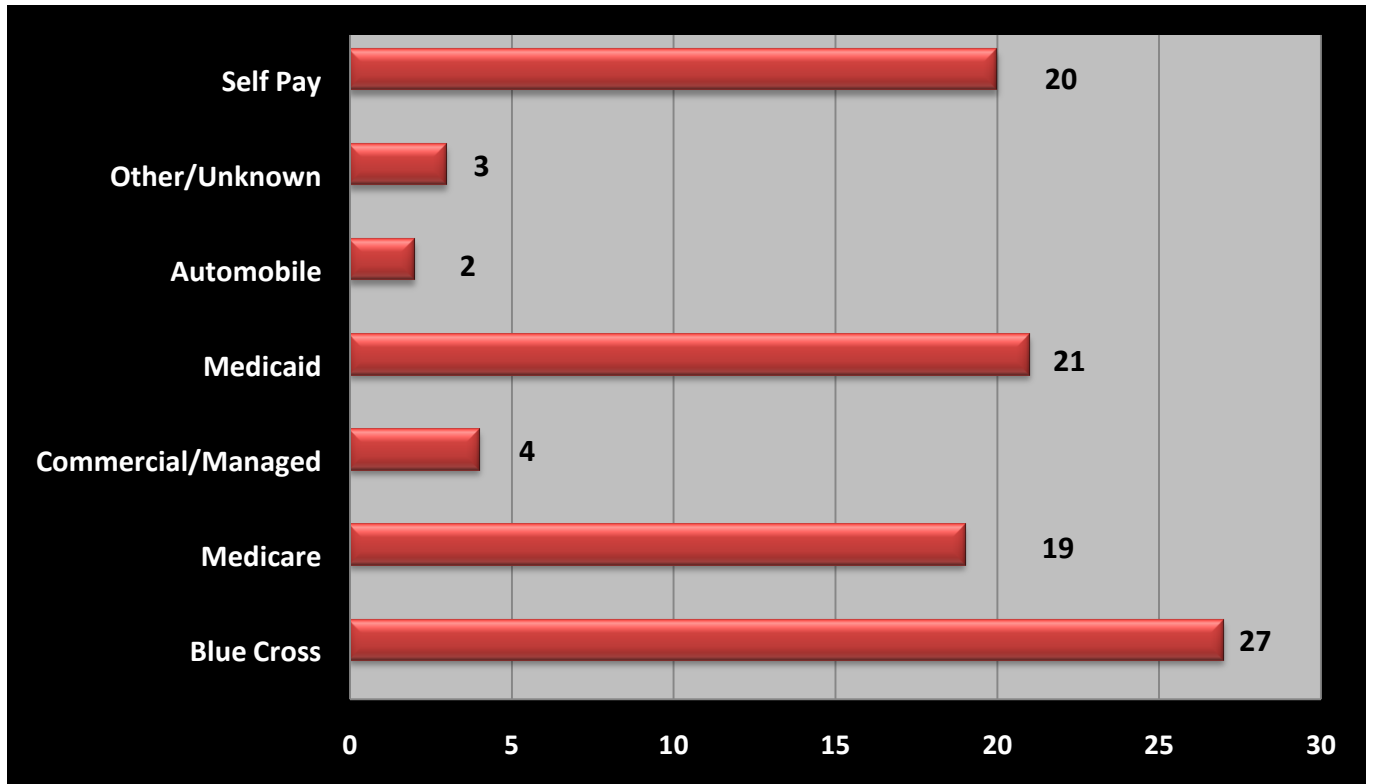
Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 96)



Fifty-two cases (54 percent) were discharged to residential rehabilitation facilities. seventeen cases (18 percent) were discharged home. Seven cases (7 percent) with both head and spinal cord injuries died. Six cases (six percent) were discharged to skilled nursing facilities (SNFs). Also, two cases (2 percent) were transferred to other acute care facilities.

Figure 19
**Payer Sources for Cases
with Both TBI and SCI**

Alabama Head and Spinal Cord Injury Registry (AHSCIR)
January 1, 2012 – December 31, 2012
(n = 96)



Blue Cross/Blue Shield paid in 27 cases (28 percent) that had both head and spinal cord injuries. Individuals or their families paid for their own medical care in 20 cases (twenty-one percent). The source of payment in nineteen cases (20 percent) was Medicare and was Medicaid in 21 cases (22 percent). Automobile insurance was the primary payer in two cases (two percent). Commercial insurance and managed care companies paid in four cases (four percent). In none of the remaining 3 cases (3 percent) could the primary payer be placed in existing categories.