

Alabama Head and Spinal Cord Injury Report

January 1, 2009 – December 31, 2009

Alabama Department of Public Health

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Background

According to the National Center for Health Statistics (NCHS), traumatic injuries cause more deaths among children and young adults than any other disease. The Alabama Center for Health Statistics (ACHS) reports that, in 2007, accidental injury alone ranks fourth overall among causes of death. 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 2009 data submitted to the ATR is ongoing since new cases from 2009 are still being submitted. However, enough data is contained in the ATR to perform a preliminary analysis of 2009 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 is 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, located in the Bureau of Health Promotion and Chronic Disease, 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 Alabama Head and Spinal Cord Injury 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, & 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

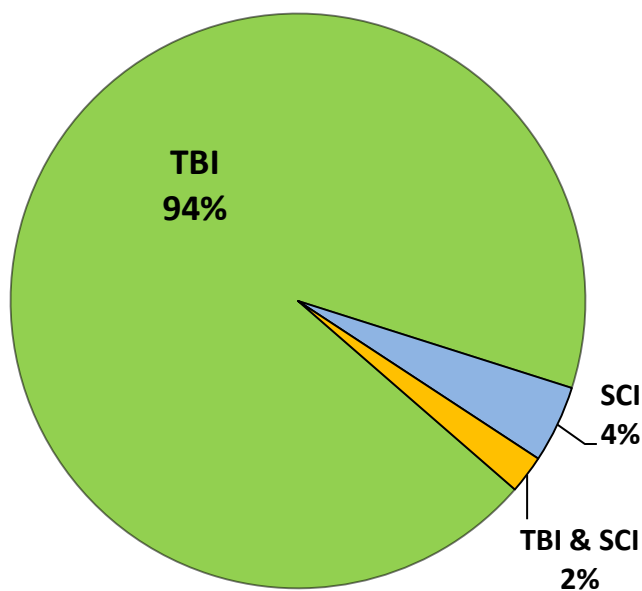
All data contained in this report must be interpreted with careful judgment. It is important to note that the information presented in this report is based on data from the ATR which, as of June 30, 2010, did not contain information from all acute care hospitals in the state. The data contained in this report cannot be construed to represent the state of Alabama as a whole and is not comparable to state or federal data from other sources.

Less severe head and spinal cord injuries may be under-represented in this analysis since less severe injuries are not submitted to the registry due to the case definition specifics or registrar omission. Additionally, mortality may be under-estimated because persons expired at the scene, were in transit to a facility, or arrived at hospitals not yet participating in the program. 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 3,265 head and spinal cord injury cases that were admitted to participating hospitals during calendar year 2009. Head injuries (TBI) constituted 94 percent (n = 3,053) of the reported cases and spinal cord injuries (SCI) constituted 4 percent (n =142). There were 70 cases (2 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.

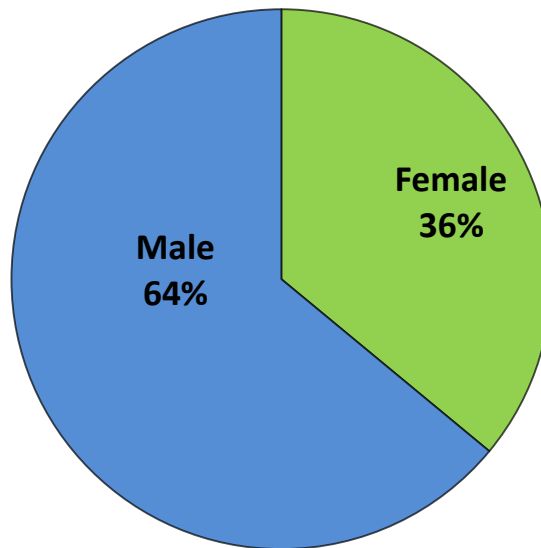
Figure 1
Type of Injury
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(N = 3,265)



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

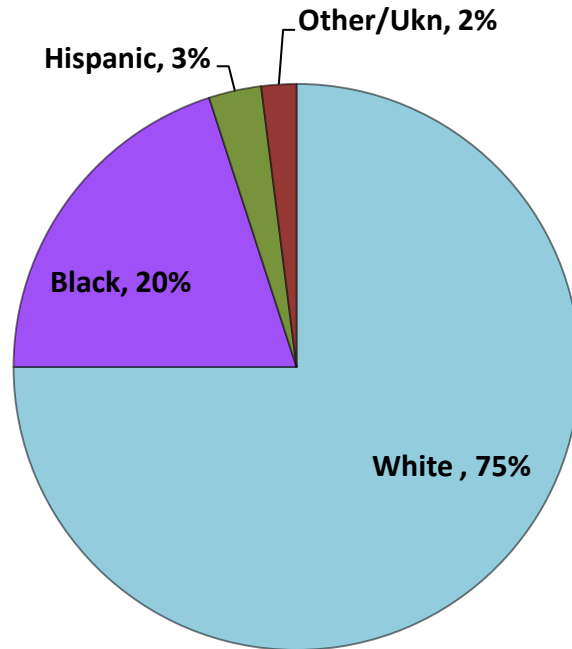
Traumatic Brain Injury

Figure 2
Proportion of TBI Cases by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n=3,053)



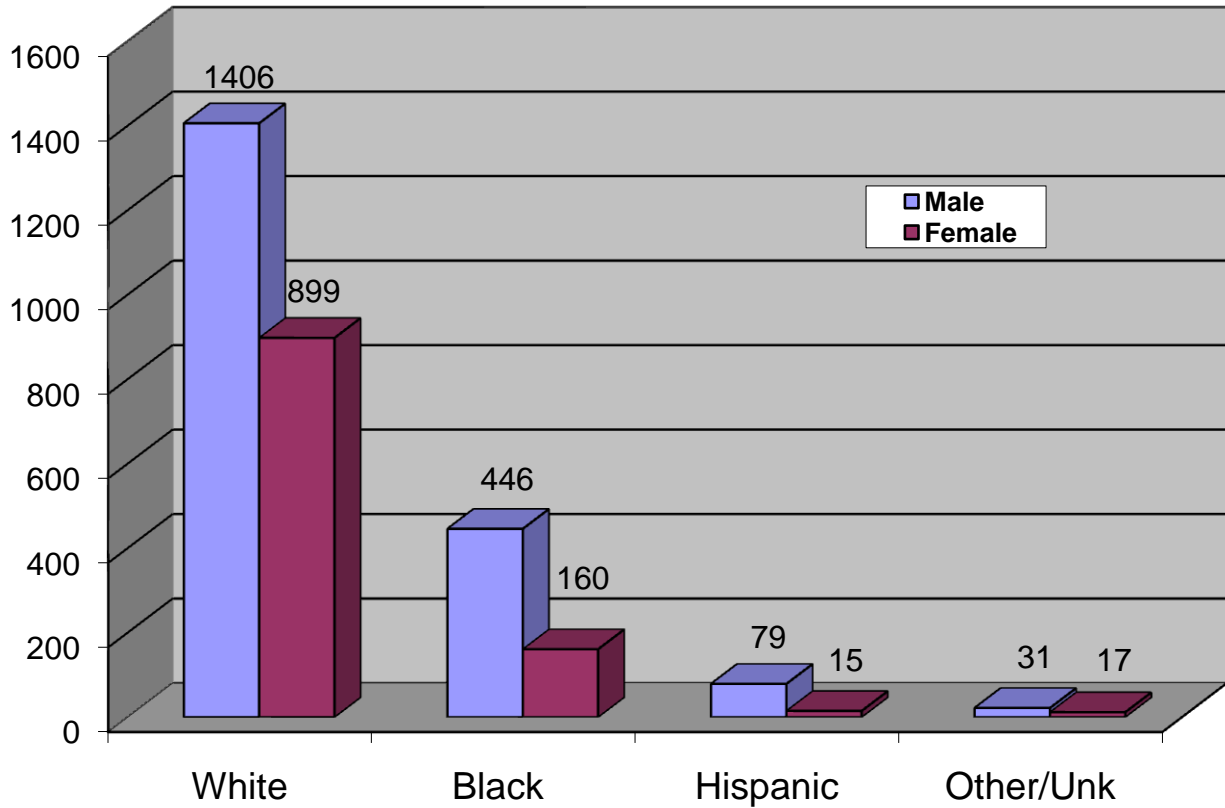
There were 1.8 times more male TBI cases (n = 1,962) than female cases (n = 1,091) reported to the ATR for calendar year 2009.

Figure 3
Proportion of TBI Cases by Race/Ethnicity
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009– December 31, 2009
(n=3,053)



Whites constitute 75 percent (n = 2,305) of the cases, Blacks 20 percent (n = 606), and Hispanics 3 percent (n = 94) of TBI cases. The Other/Unknown category comprises 2 percent (n = 48).

Figure 4
Number of TBI Cases by Gender & Race
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2009 – December 31, 2009
 (n = 3,053)



Sixty-one percent (n = 1,406) of TBI cases in whites were male, seventy-four percent (n = 446) of black cases were male, eighty-four percent (n = 79) in Hispanics were male, and sixty-five percent (n = 31) of the “Other” category, which includes those of Asian, American Indian and unknown ethnicity, were male. The overall percentages in this injury type were 64 percent male and 36 percent female (see Figure 2).

Table 1
2009 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 3,045)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	36	25	21	7	7	2	98	3.2%
5 to 14	63	39	25	11	6	2	146	4.8%
15-24	309	152	113	48	29	8	659	21.6%
25-34	200	110	75	21	35	7	448	14.7%
35-44	197	108	70	19	15	4	413	13.6%
45-54	195	94	67	23	8	2	389	12.8%
55-64	165	99	39	6	4	3	316	10.4%
65-74	100	77	23	3	3	1	207	6.8%
75-84	96	129	10	11	0	2	248	8.1%
>84	45	64	3	8	0	1	121	4.0%
Total	1,406	897	446	157	107	32	3045	100%
% Total	46.2%	29.5%	14.6%	5.1%	3.5%	1.1%	100%	

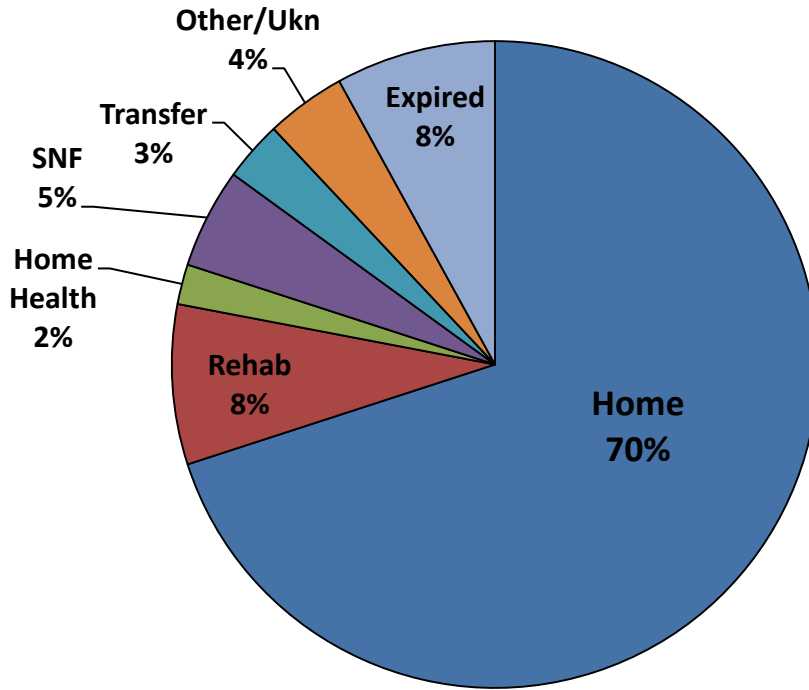
The 15-24 year old age group sustained the largest percentage of TBI cases both in 2008, 18.7% percent (n = 682), and 2009, 21.6% percent (n = 659). In 2008, the ages of 96 TBI cases were unknown and, in 2009, the ages of 8 TBI cases were not known. The percentages used here exclude the cases of unknown age from the subpopulation. The “Other” category in the data includes Asians, Hispanics, and others.

Table 2
2008 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 3,645)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	42	29	38	9	8	7	133	3.6%
5 to 14	97	76	37	32	4	5	251	6.9%
15-24	344	152	111	35	32	8	682	18.7%
25-34	285	111	104	28	28	11	567	15.5%
35-44	211	96	73	33	22	1	436	12.0%
45-54	217	101	86	31	6	2	443	12.2%
55-64	168	126	44	14	3	2	357	9.8%
65-74	118	93	17	7	2	3	240	6.6%
75-84	105	156	9	15	2	8	295	8.1%
>84	67	146	21	7	0	0	241	6.6%
Total	1654	1086	540	211	107	47	3645	100%
% Total	45.4%	29.8%	14.8%	5.8%	2.9%	1.3%	100%	

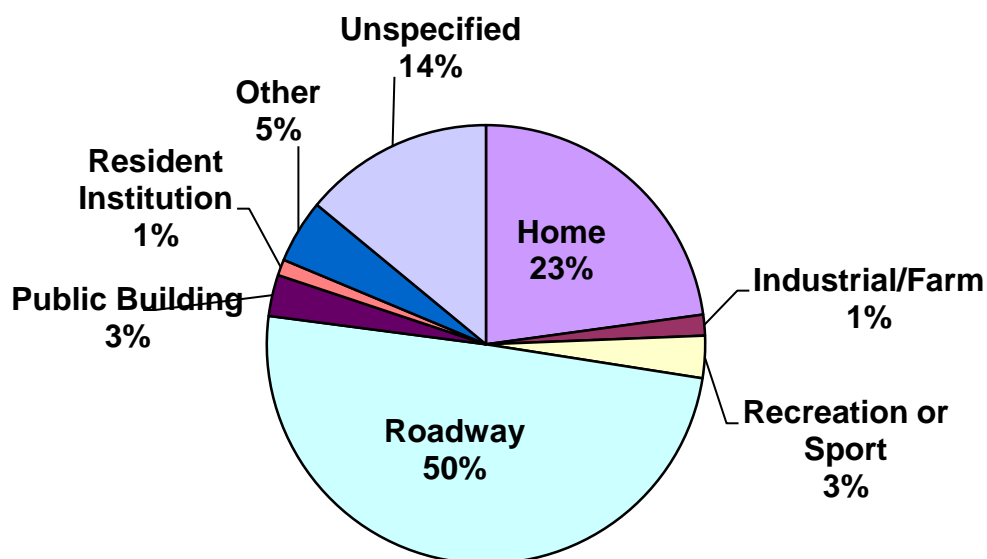
Figure 5
Discharge Disposition Following TBI Cases
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 3,053)



By far the greatest portion, seventy percent (n = 2,155), were discharged home. From the data, it cannot be determined how many of these were referred to outpatient rehab facilities. Two percent (n = 69) were discharged to home health services. Eight percent (n = 240) of TBI cases died. Three percent (n = 80) were transferred to other acute care hospitals. Eight percent (n = 232) were transferred to inpatient rehab facilities. Five percent (n = 166) were sent to skilled nursing facilities (SNF). The “Other” category includes psychiatric hospitals, hospices, and assisted living facilities, as well as “against medical advice,” and “undocumented” discharge destinations.

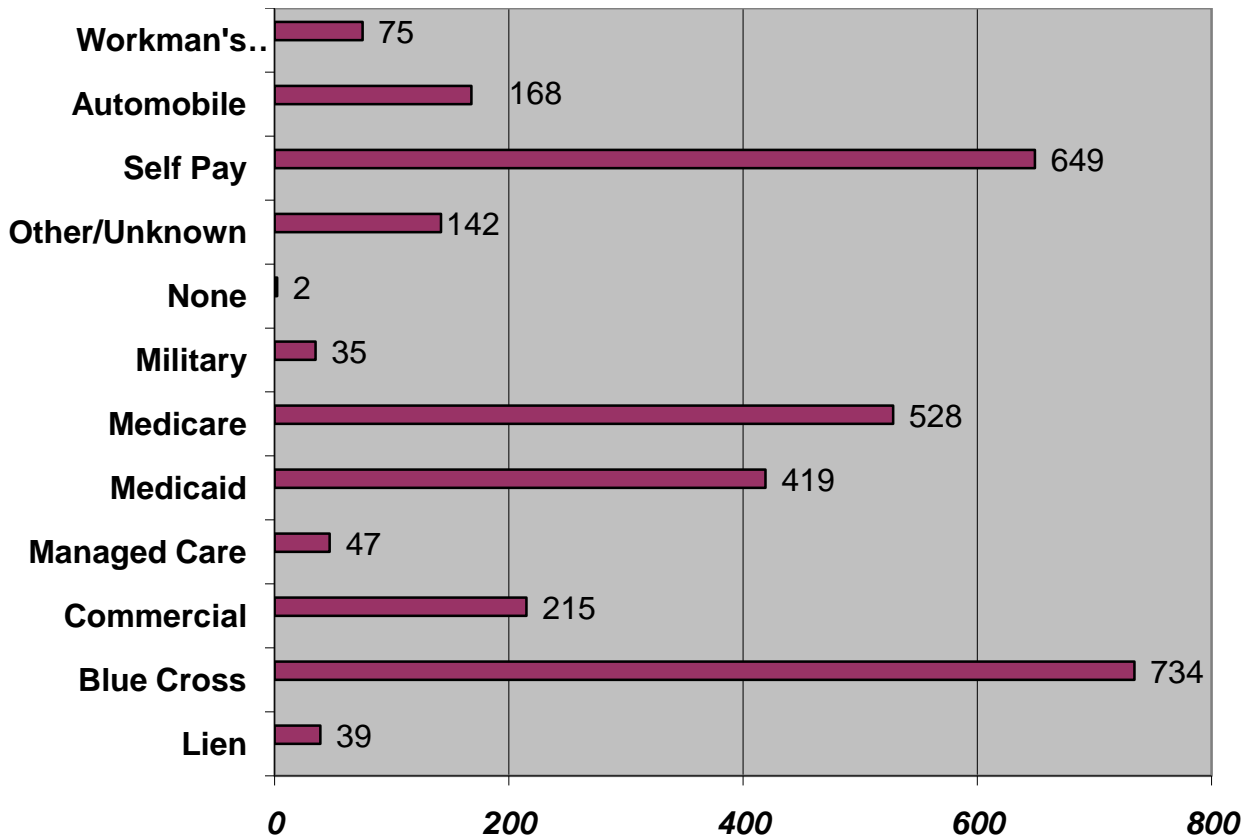
Figure 6
Site of Injury Occurrence in TBI Cases

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 3,053)



Most traumatic brain injuries, fifty percent (n = 1,514), reported to the ATR occurred on roads, streets and highways; twenty-three percent (n = 697) occurred in the home; three percent (n = 94) in places for sports and recreation, three percent in public buildings (n = 93), one percent (n = 36) in residential institutions such as hospitals and nursing homes, one percent (n = 47) in industrial or farming settings, and five percent (n = 157) in a variety of other settings. Fourteen percent (n = 415) of cases had no site specified.

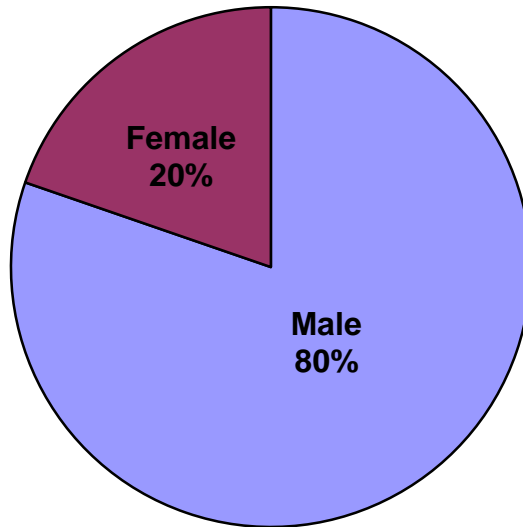
Figure 7
Payer Source for TBI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2009 – December 31, 2009
 (n = 3,053)



Individuals paid for their own care in twenty-one percent (n = 649) of cases according to information sent to the ATR. Twenty-four percent (n = 734), were paid for by various Blue Cross/Blue Shield plans. Medicare and Medicaid paid in 17 percent (n = 528) and 14 percent (n = 419), respectively. Various commercial insurance companies were primary payers in 7 percent (n = 215) of TBI cases reported to the Registry. Military insurance plans paid in 1 percent (n = 35), workman's compensation was the primary payer in 3 percent (n = 75), and hospital liens were held in 1 percent (n = 39). There was no payment in less than 1 percent, (n = 2) of cases. Similarly, payment source was indicated as other or not documented in less than five percent (n = 142) of these cases. The source of payment data sent to the ATR is particularly subject to misclassification for various reasons, e.g. the commercial group might include some managed care organizations or the primary payment source may not be properly submitted when there are multiple sources of payment.

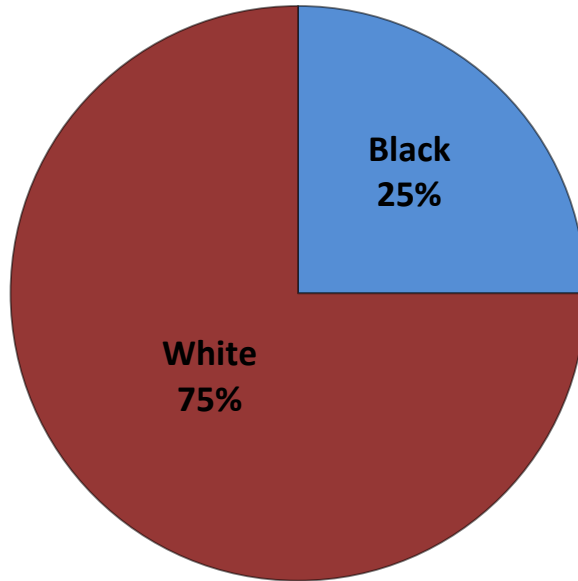
Spinal Cord Injury

Figure 8
Proportion of SCI Cases by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 142)



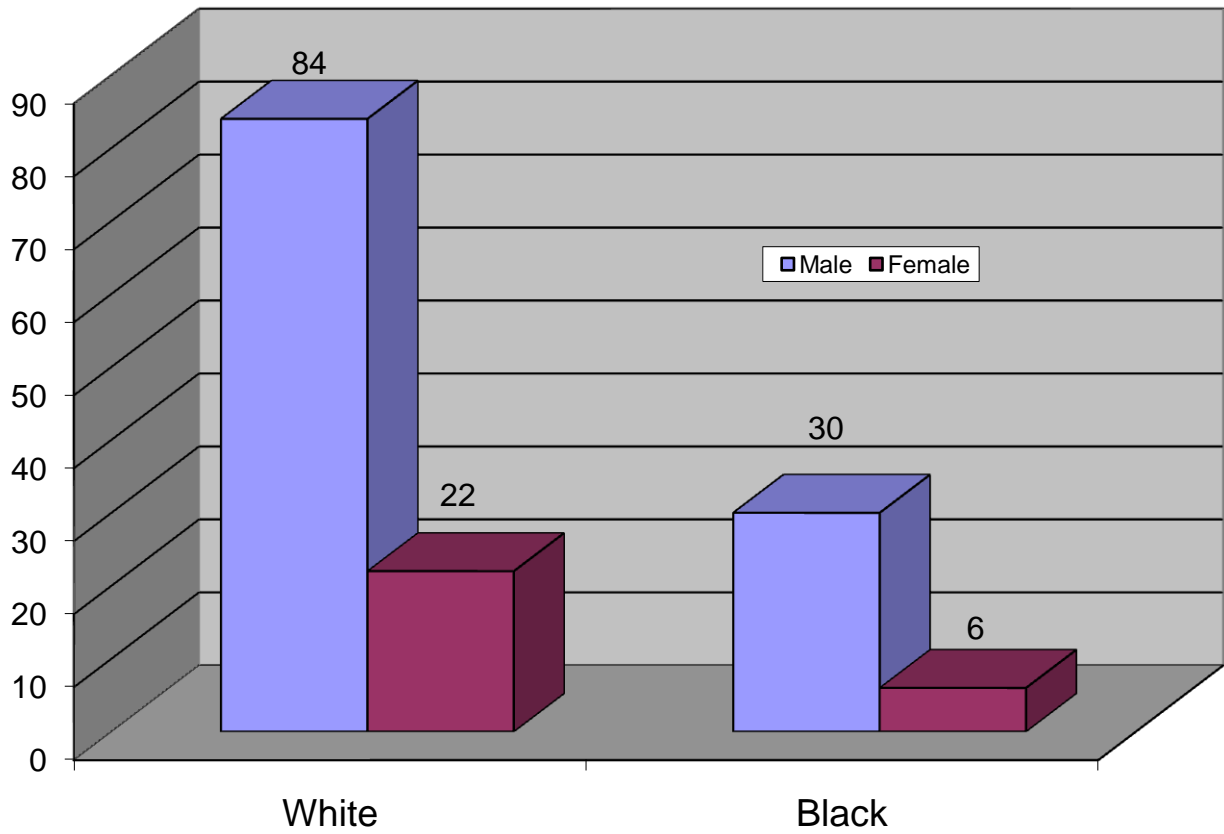
There were 4.1 times more male SCI cases (n = 114) than female cases (n = 28) reported to the Alabama Trauma Registry for calendar year 2009.

Figure 9
Proportion of SCI Cases by Race
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 142)



Whites constituted 75 percent (n = 106) of the SCI cases and Blacks 25 percent (n = 36) in calendar year 2009.

Figure 10
Number of SCI Cases by Race/Ethnicity and Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 142)



Seventy-nine percent (n = 84) of SCI cases in whites were male and eighty-three percent (n =30) in blacks were male.

Table 3
2009 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2009 – December 31, 2009
 (n = 142)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	0	0	0	0	1	0	1	0.7%
5 to 14	0	1	0	0	0	0	1	0.7%
15-24	15	5	7	2	2	0	31	21.8%
25-34	12	1	12	1	1	0	27	19.0%
35-44	8	2	4	1	0	0	15	10.6%
45-54	15	6	2	0	0	0	23	16.2%
55-64	10	2	4	1	1	0	18	12.7%
65-74	9	1	0	0	0	0	10	7.0%
75-84	6	4	0	1	0	0	11	7.8%
>84	4	0	1	0	0	0	5	3.5%
Total	79	22	30	6	5	0	142	100%
% Total	55.6%	15.6%	21.1%	4.2%	3.5%	0	100%	

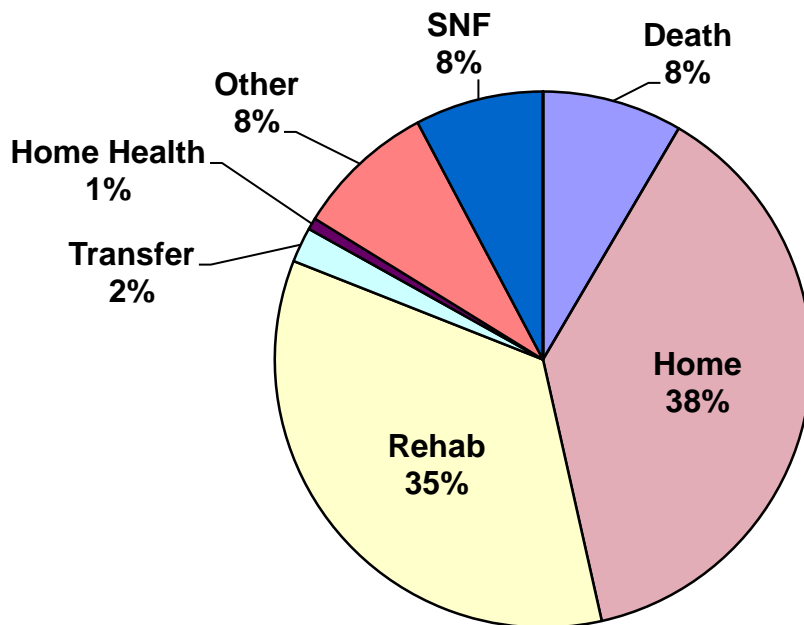
The 15-24 year old age group experienced the largest percentage of spinal cord injuries in 2009, 21.8 percent (n = 31), as was the case in 2008, 22.9 percent (n = 32). The “Other” category in the table on this page includes Asians, Hispanics, and other ethnic groups.

Table 4
2008 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 133)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	0	0	0	0	0	0	0	0.00
5 to 14	2	0	0	3	0	0	5	3.6%
15-24	14	4	13	1	0	0	32	22.9%
25-34	8	1	7	0	0	0	16	11.4%
35-44	9	2	10	0	0	0	21	15.0%
45-54	11	5	6	1	0	0	23	16.4%
55-64	5	2	3	0	0	0	10	7.1%
65-74	5	7	1	0	0	0	13	9.3%
75-84	2	3	1	2	0	0	8	5.7%
>84	3	1	0	0	1	0	5	3.6%
Total	59	25	41	7	1	0	133	100%
% Total	44.4%	18.8%	30.8%	5.3%	0.7%	0.00	100%	

Figure 11
Discharge Disposition Following SCI Cases
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 142)



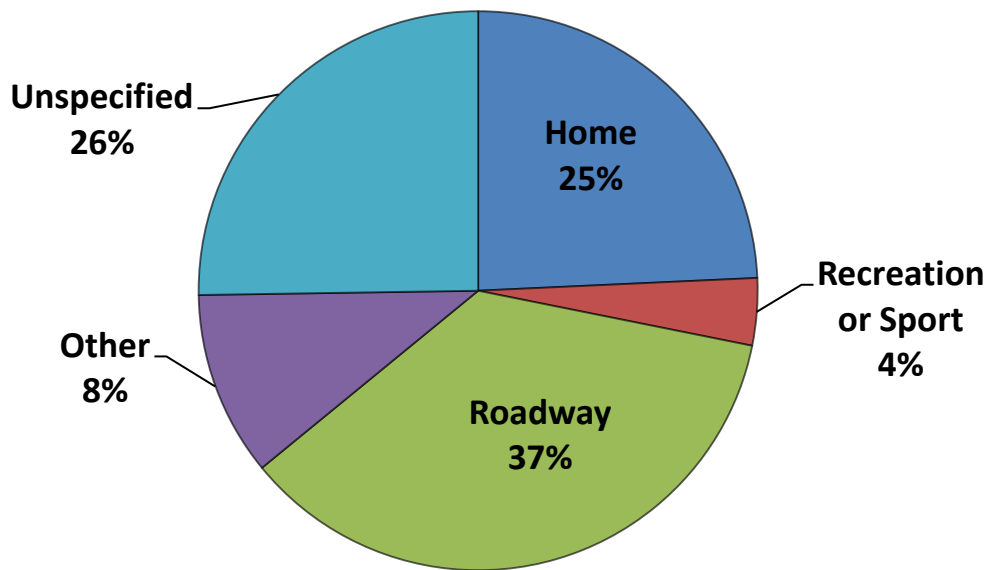
Thirty-five percent (n = 49) of SCI cases went to residential rehabilitation facilities and eight percent (n = 11) went to skilled nursing facilities (SNFs) after discharge. Thirty-eight percent (n = 54) were discharged home. One percent (n = 1) was referred to home health services. Two percent (n = 3) were transferred to other acute care facilities. Eight percent (n = 12) of SCI cases expired.

Figure 12
Site of Injury Occurrence in SCI Cases

Alabama Head and Spinal Cord Registry (AHSCIR)

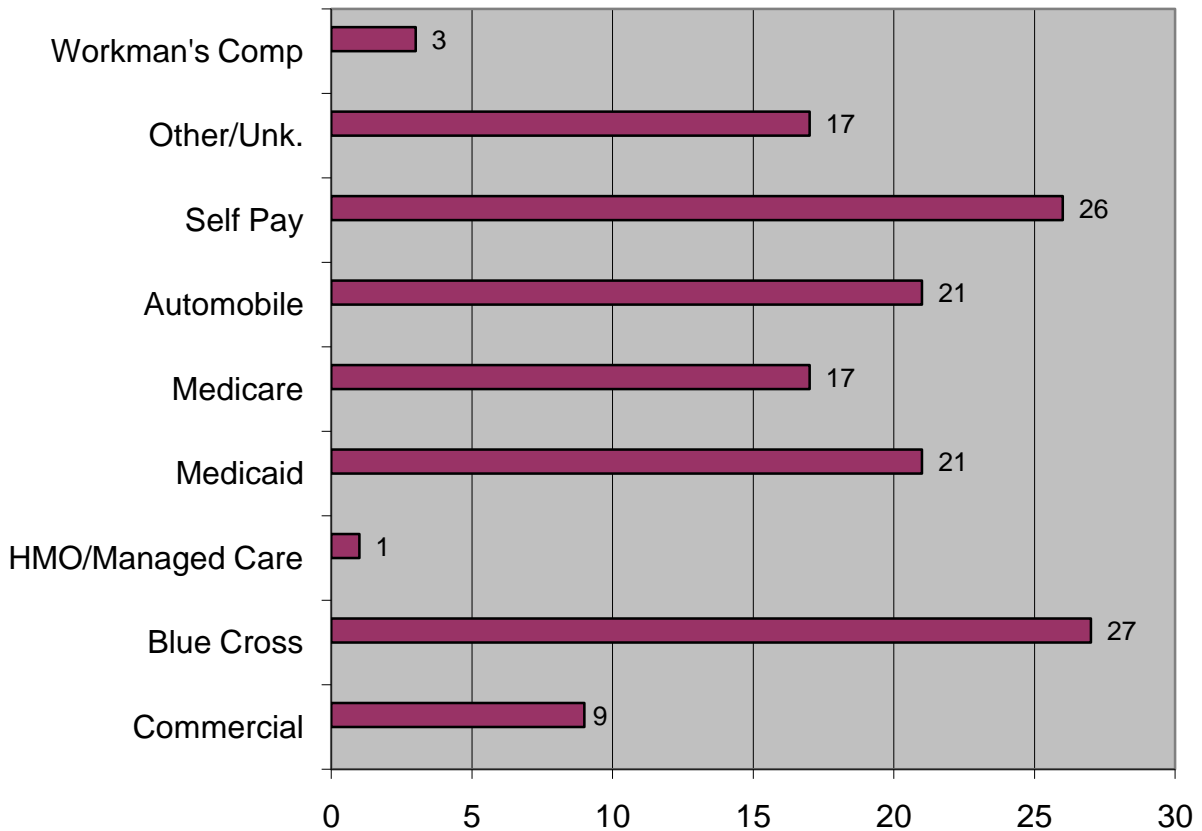
January 1, 2009 – December 31, 2009

(n = 142)



Most spinal cord injuries, thirty-seven percent (n = 52), reported to the ATR occurred on roadways. Twenty-five percent (n = 36) occurred in private residences. Four percent (n = 6) in places for sports and recreation. Twenty-six percent (n = 37) had no injury setting documented. The remaining eleven percent (n = 11) were in various other specified settings.

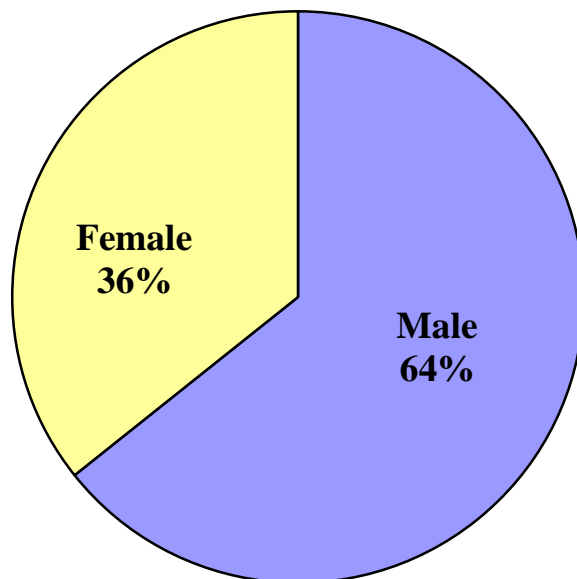
Figure 13
Payer Source for SCI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2009 – December 31, 2009
 (n = 142)



Blue Cross/Blue Shield was the primary payer in 19 percent (n = 27) of SCI cases and was the most frequent primary reimbursement source in this subgroup. Individuals and/or their families covered 18 percent (n = 21) of documented SCIs in 2009. Medicare and Medicaid were the primary payers in 12 percent (n = 17) and 15 percent (n = 21), respectively. The primary payer was private commercial insurance in six percent (n = 9) of cases. Workman's compensation was the primary payer in 2 percent (n = 3) of cases. Automobile insurance was the primary payer in 15 percent (n = 21). The source of payment was not reported or there were other payment sources, e.g. military, municipal governments, in 12 percent (n = 17).

Cases with Both Head and Spinal Cord Injuries

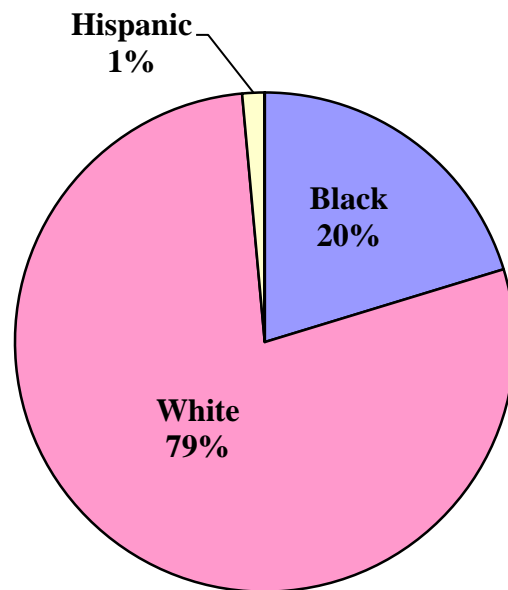
Figure 14
Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 70)



There were 1.8 times more male cases (n = 45) with simultaneous head and spinal cord injuries than female cases (n = 25) reported to the Alabama Trauma Registry for calendar year 2009.

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

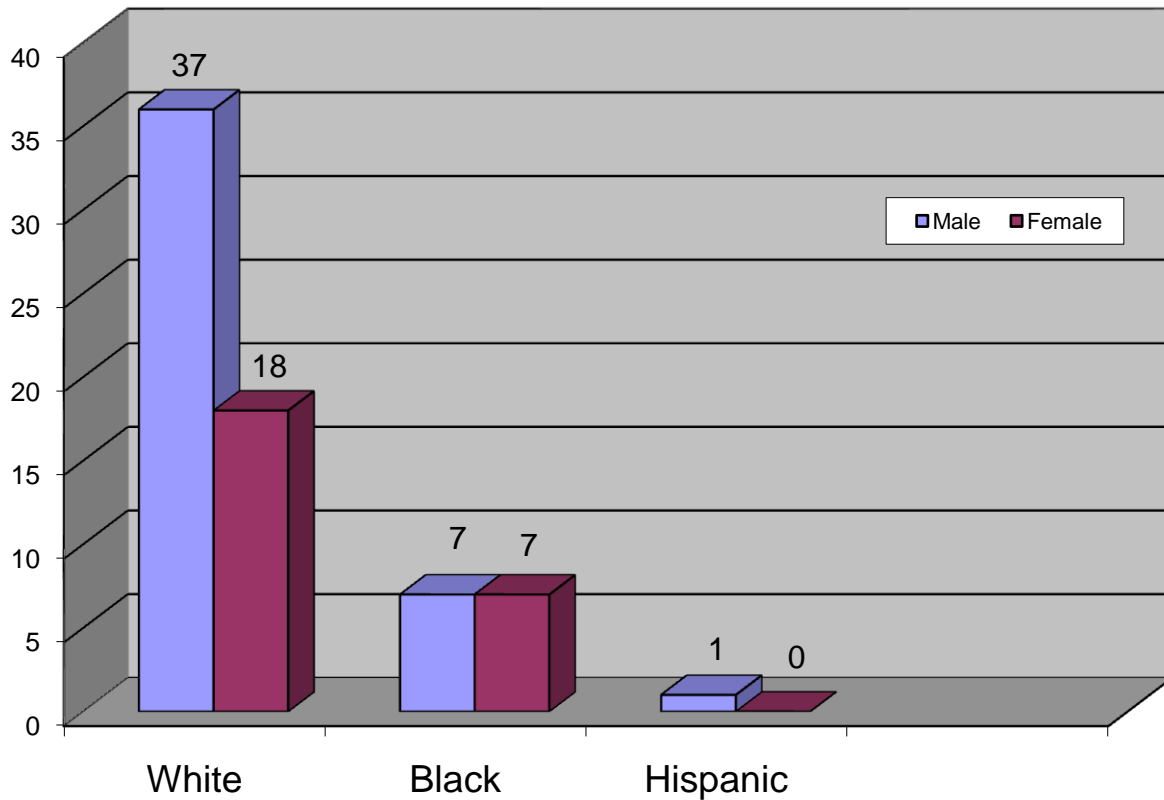
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 70)



Whites constitute 79 percent (n =55) of the cases with both head and spinal cord injuries, Blacks 20 percent (n = 14), and Hispanics 1 percent (n =1).

Figure 16
Number of Cases with Both TBI and SCI by Gender and Race/Ethnicity

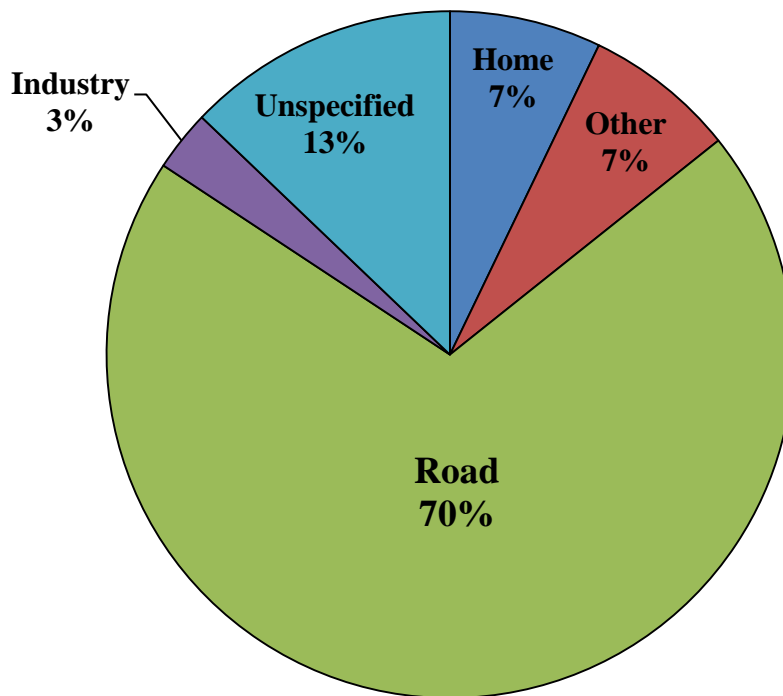
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 70)



Sixty-seven percent (n = 37) of cases with both head and spinal cord injuries in whites were male, fifty percent (n = 7) in Blacks were male, and the only Hispanic case was male. The overall percentages in this injury type were 75 percent male and 25 percent female.

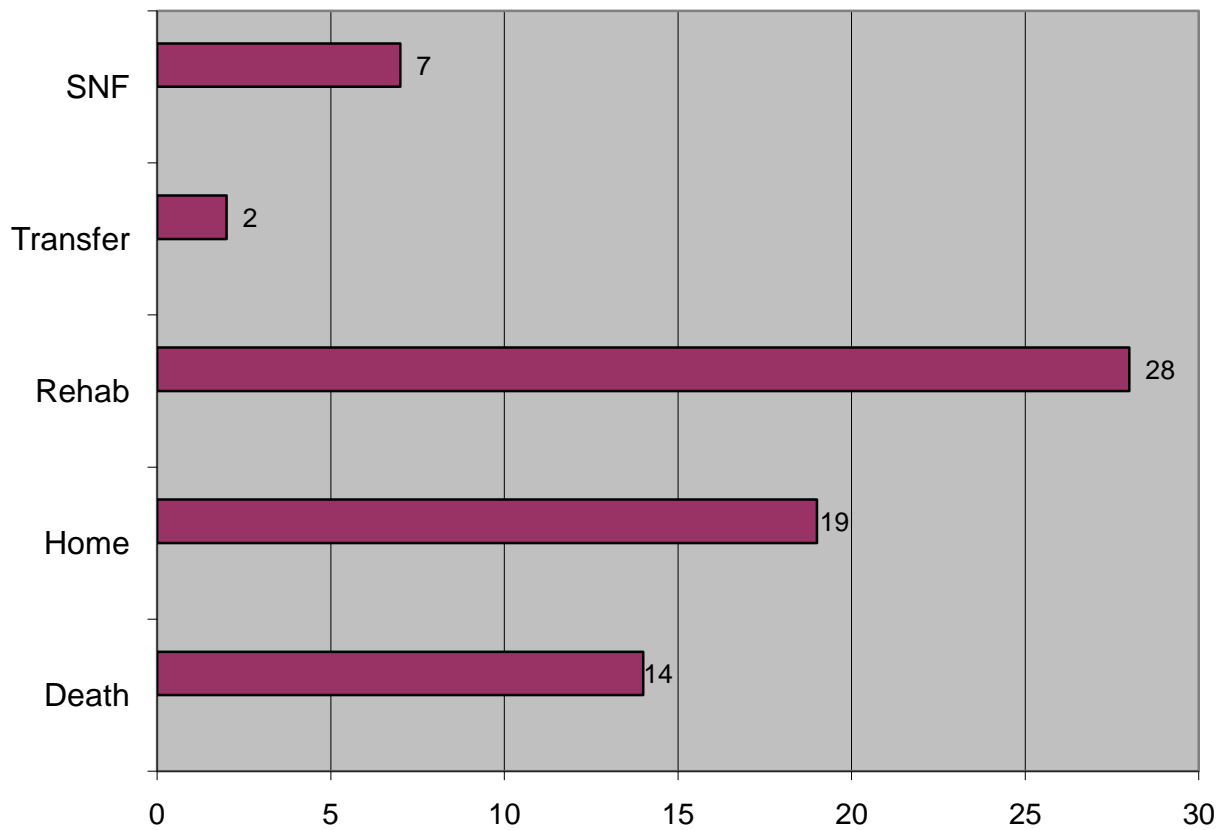
Figure 17
Site of Injury Occurrence in Cases with Both TBI and SCI

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 70)



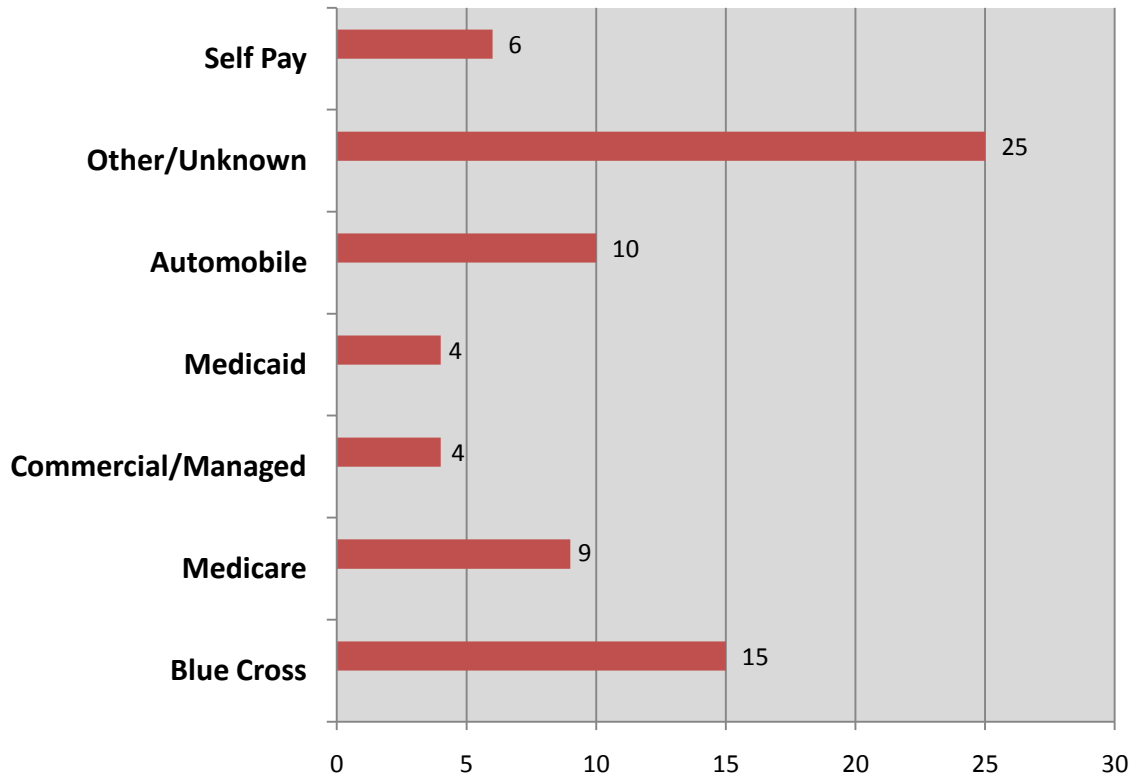
Seventy percent (n = 49) of ATR cases that had both TBI and SCI occurred on roadways. Seven percent (n = 5) occurred in the home. Three percent (n = 2) occurred in industrial settings. Nine percent (n = 5) occurred in other specified places. The place of injury was not specified in thirteen percent of cases (n = 9).

Figure 18
Discharge Disposition Following Cases with Both TBI and SCI
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2009 – December 31, 2009
(n = 70)



Twenty-eight cases (40 percent) were discharged to residential rehabilitation facilities. Nineteen (27 percent) were discharged home. Fourteen cases (20 percent) with both head and spinal cord injuries died. Notably, this is the highest percent of mortality among all three categories. Seven (10 percent) were discharged to skilled nursing facilities (SNFs). Two cases (3 percent) were transferred to other acute care facilities.

Figure 19
Payer Sources for Cases with Both TBI and SCI
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2009 – December 31, 2009
 (n = 70)



Blue Cross/Blue Shield paid in 15 cases (21 percent) that had both head and spinal cord injuries. Individuals or their families paid for their own medical care in 6 cases (9 percent). The source of payment in nine cases (13 percent) was Medicare and Medicaid in four cases (6 percent). Automobile insurance was the primary payer in 10 cases (14 percent). Commercial insurance and managed care companies paid in four cases (6 percent). In the remaining 25 cases (36 percent), the primary payer was either not documented or payment was made by other sources not represented in the above graphic.