

Alabama Head and Spinal Cord Injury Report

January 1, 2008 – December 31, 2008

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 2006, 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 2008 data submitted to the ATR is ongoing. Until data analysis is completed, this report must be considered preliminary. However, enough data is contained in the ATR to perform a preliminary analysis of 2008 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, 2009, 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.

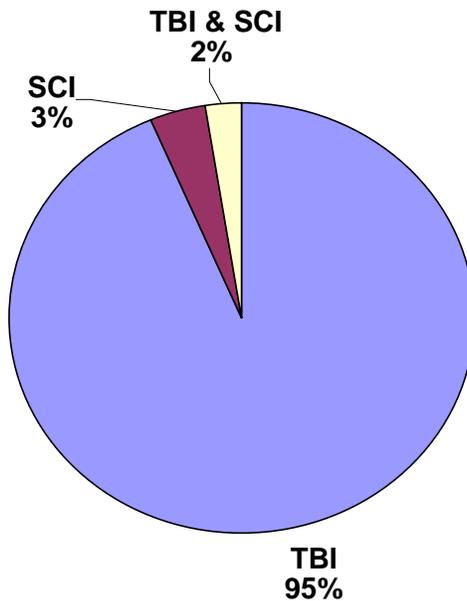
Less severe head and spinal cord injuries may be under-represented in this analysis since less severe injuries are not submitted to the registry due to the case definition specifics or registrar omission. Additionally, mortality may be under-estimated because persons expired at the scene, were in transit 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.

Discharge Disposition, Site of Injury Occurrence and Primary Payer data were not available for analysis from 1,092 TBI Cases, 40 SCI cases, and 5 cases with simultaneous TBI/SCI. 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 3,934 head and spinal cord injury cases that were admitted to participating hospitals during calendar year 2008. Head injuries (TBI) constituted 95 percent (n = 3,731) of the reported cases and spinal cord injuries (SCI) constituted 3 percent (n =140). There were 63 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. All categories are mutually exclusive.

Figure 1
Type of Injury
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(N = 3,934)



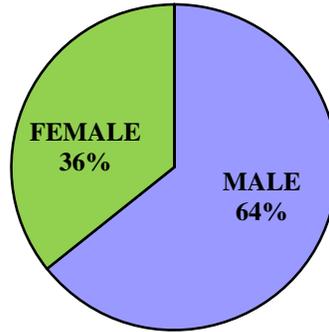
Population size of each category will be noted in the caption for each graphic illustration.

Traumatic Brain Injury

Figure 2

Proportion of TBI Cases by Gender

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n=3,731)

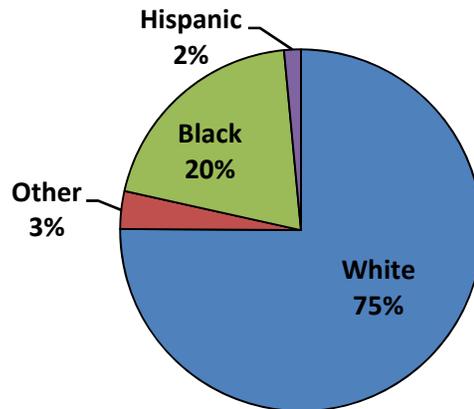


There were 1.8 times more male TBI cases (n = 2,391) than female cases (n = 1,329) reported to the ATR for calendar year 2008.

Figure 3

Proportion of TBI Cases by Race/Ethnicity

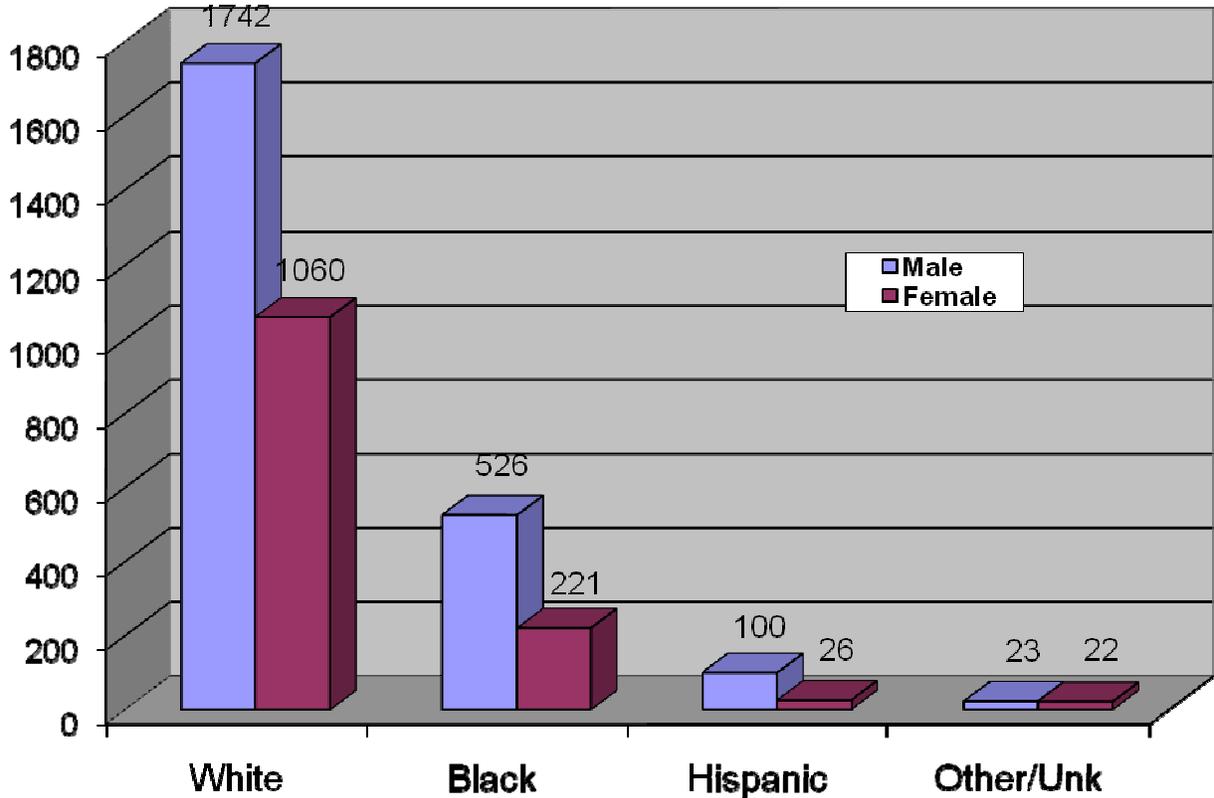
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008– December 31, 2008
(n=3,731)



Whites constitute 75 percent (n = 2,802) of the cases, Blacks 20 percent (n = 614), and Hispanics 2 percent (n = 31) of TBI cases. The Other/Unknown category comprises 3 percent (n = 38).

Figure 4
Number of TBI Cases by Gender & Race/Ethnicity

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 3,731)



Sixty-two percent (n = 1,742) of TBI cases in whites were male, seventy percent (n = 526) of black cases were male, eighty percent (n = 100) in Hispanics were male, and fifty-one percent (n = 23) 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
2008 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 3,731)

| 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 | 15.6% |
| 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 | 6.9% |
| 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 | 99.8% |
| % Total | 45.4% | 29.7% | 14.8% | 5.8% | 2.9% | 1.3% | 99.9% | |

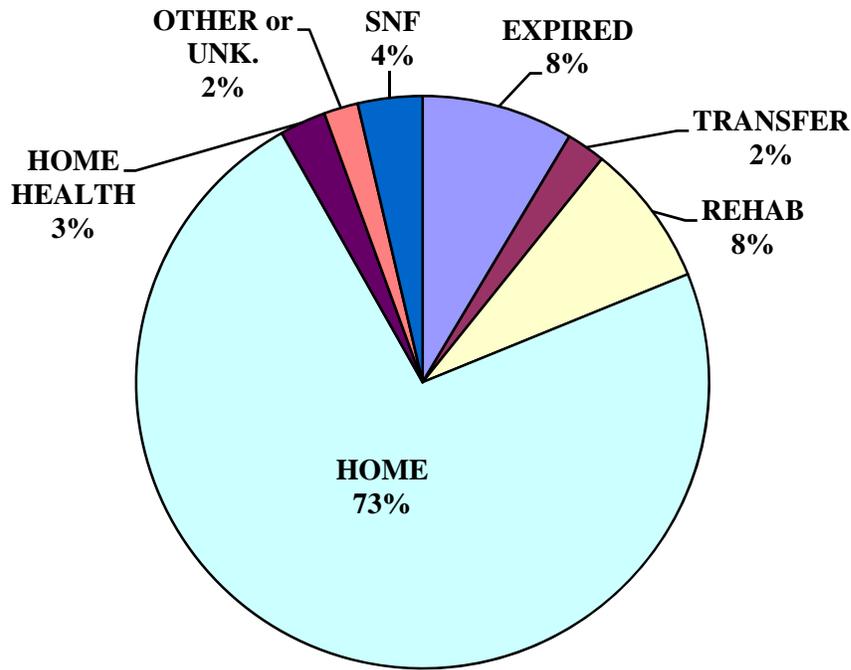
The 15-24 year old age group sustained the largest percentage of TBI cases both in 2007, 26.8 percent (n = 736), and 2008, 18.7 percent (n = 682). In 2007, the ages of four TBI cases were unknown and, in 2008, the ages of 96 TBI cases were not known. The “Other” category in the data includes Asians, Hispanics, and others.

Table 2
2007 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 2,441)

| Age | White Males | White Females | Black Males | Black Females | Other Males | Other Females | Total | % Total |
|----------------|--------------|---------------|--------------|---------------|-------------|---------------|--------------|--------------|
| <5 | 32 | 13 | 14 | 14 | 8 | 4 | 85 | 3.1% |
| 5 to 14 | 70 | 35 | 29 | 15 | 9 | 4 | 162 | 5.9% |
| 15-24 | 314 | 182 | 129 | 51 | 52 | 8 | 736 | 26.8% |
| 25-34 | 210 | 83 | 84 | 37 | 32 | 1 | 447 | 16.3% |
| 35-44 | 181 | 96 | 63 | 27 | 19 | 3 | 389 | 14.1% |
| 45-54 | 173 | 74 | 58 | 17 | 11 | 1 | 334 | 12.1% |
| 55-64 | 105 | 70 | 27 | 15 | 5 | 1 | 223 | 8.1% |
| 65-74 | 79 | 60 | 13 | 5 | 3 | 2 | 162 | 5.9% |
| 75-84 | 70 | 70 | 5 | 7 | 1 | 2 | 155 | 5.6% |
| >84 | 17 | 32 | 2 | 2 | 0 | 0 | 53 | 1.9% |
| Total | 1251 | 715 | 424 | 190 | 140 | 26 | 2746 | 99.8% |
| % Total | 45.5% | 26.0% | 15.4% | 6.9% | 5.1% | 1.0% | 99.9% | |

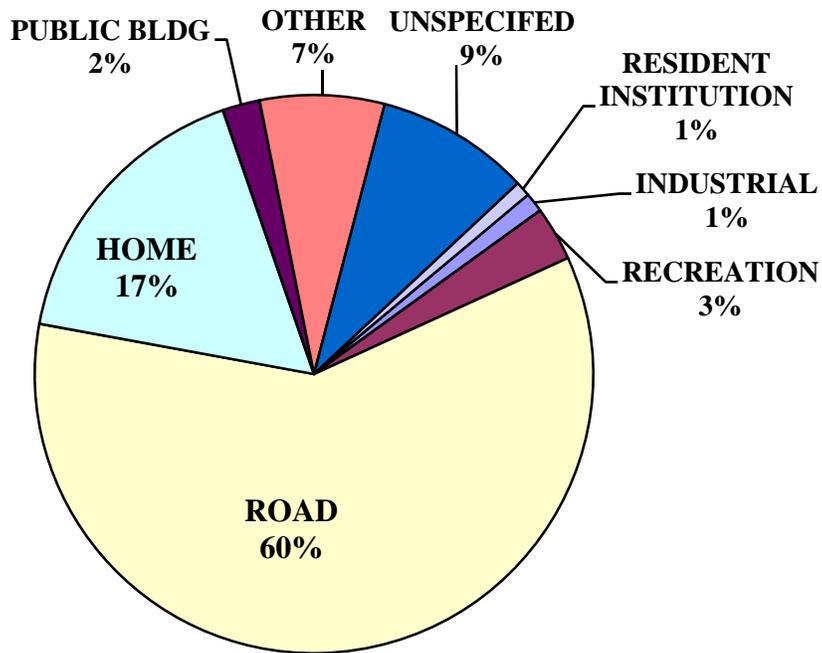
Figure 5
Discharge Disposition Following TBI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 2,639)



By far the greatest portion, seventy-three percent (n = 1,928), were discharged home. From the data, it cannot be determined how many of these were referred to outpatient rehab facilities. Three percent (n = 69) were discharged to home health services. Eight percent (n = 226) of TBI cases died. Two percent (n = 58) were transferred to other acute care hospitals. Eight percent (n = 213) were transferred to inpatient rehab facilities. Four percent (n = 96) 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

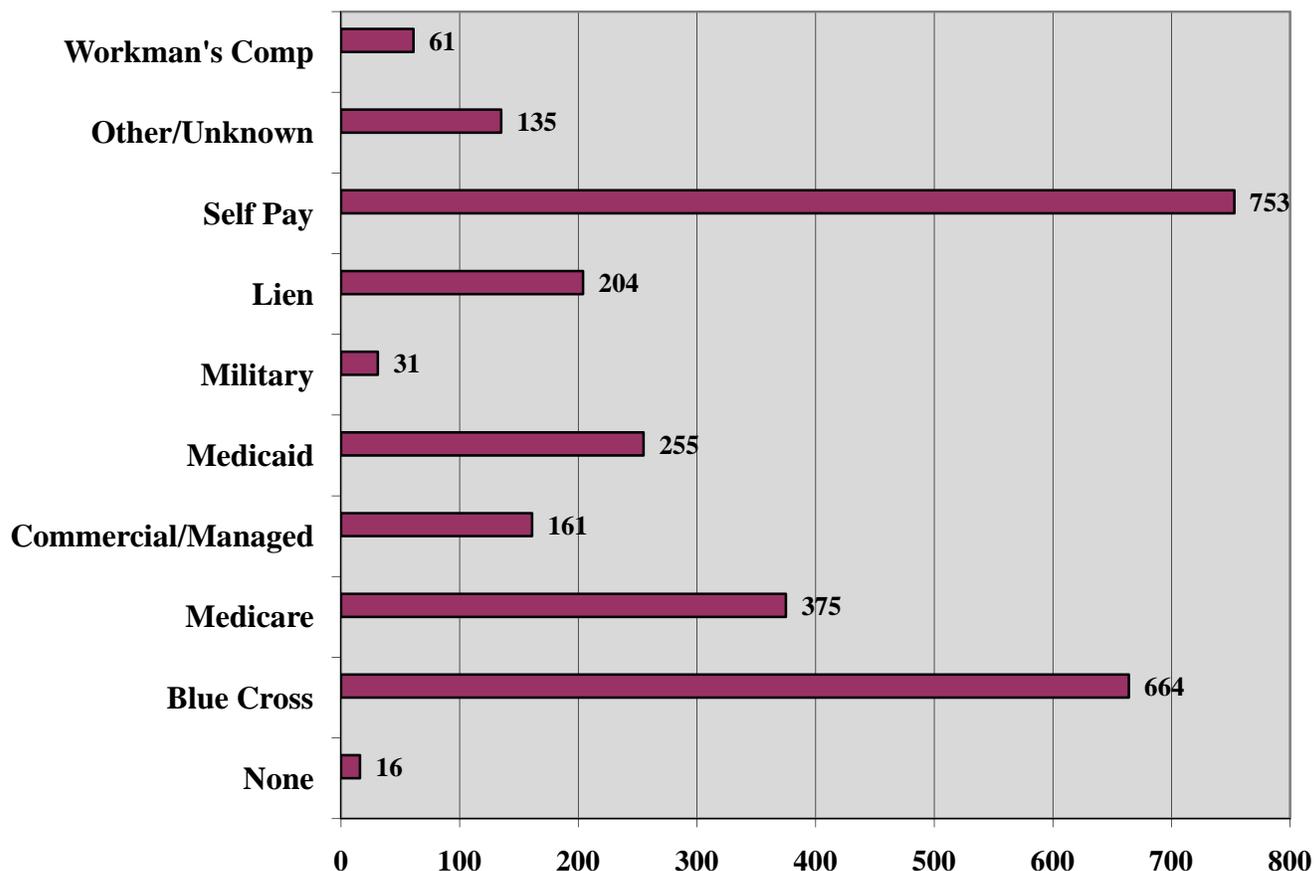
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 2,639)



Most traumatic brain injuries, sixty percent (n = 1,576), reported to the ATR occurred on roads, streets and highways, seventeen percent (n = 444) occurred in the home, three percent (n = 83) in places for sports and recreation, two percent (n = 57), one percent (n = 23) in residential institutions such as hospitals and nursing homes, one percent (n = 30) in industrial settings, and seven percent (n = 190) in a variety of other settings. Nine percent (n = 236) of cases had no site specified.

Figure 7
Payer Source for TBI Cases

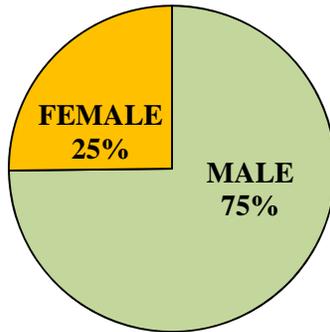
Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 2,639)



Individuals paid for their own care in 29 percent (n = 753) of cases according to information sent to the ATR. Twenty-five percent (n = 664), were paid for by various Blue Cross/Blue Shield plans. Medicare and Medicaid paid in 14 percent (n = 375) and 10 percent (n = 255), respectively. Various commercial insurance companies were primary payers in 6 percent (n = 161) of TBI cases reported to the Registry. Military insurance plans paid in 1 percent (n = 31), workman's compensation was the primary payer in 2 percent (n = 61), and hospital liens were held in 8 percent (n = 204). There was no payment in only 1 percent (n = 16) of cases. Similarly, payment source was not documented in less than one percent (n = 8) 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.

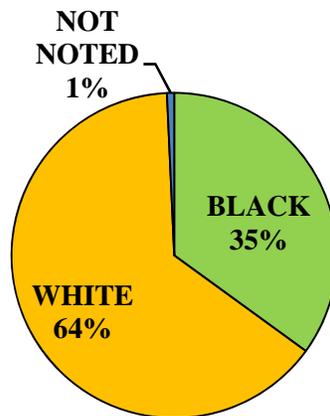
Spinal Cord Injury

Figure 8
Proportion of SCI Cases by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 140)



There were 3.0 times more male SCI cases (n = 104) than female cases (n = 35) reported to the Alabama Trauma Registry for calendar year 2008. One record had no value in this field.

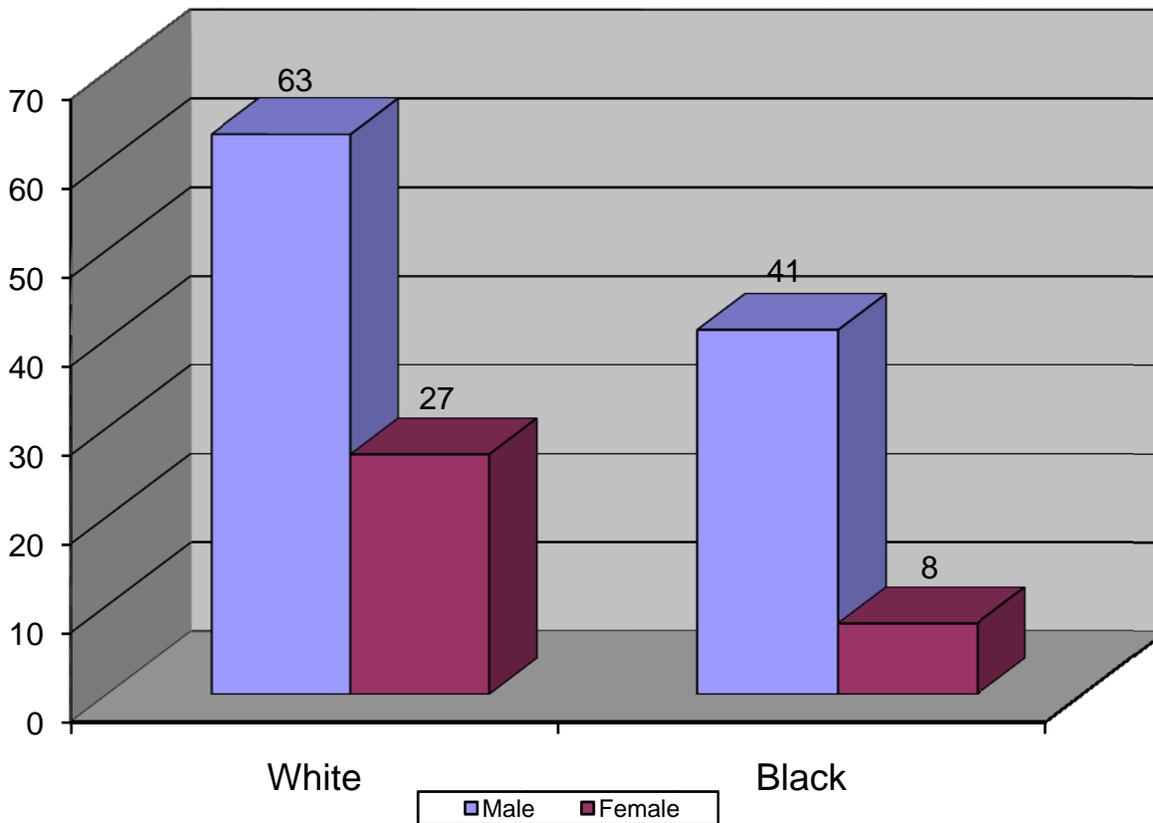
Figure 9
Proportion of SCI Cases by Race/Ethnicity
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 140)



Whites constitute 64 percent (n = 68) of the SCI cases and Blacks 35 percent (n = 47). The race/ethnicity was not noted in 1 percent (n = 1) of SCI cases.

Figure 10
Number of SCI Cases by Race/Ethnicity and Gender

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 140)



Seventy-percent (n = 63) of SCI cases in whites were male and eighty-four percent (n = 41) in blacks were male. Race was not noted in one case. The overall percentages in this injury type were 75 percent male and 25 percent female (see Figure 8).

Table 3
2008 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 140)

| 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 | 100.00% |
| % Total | 42.1% | 17.9% | 29.3% | 5.0% | 0.7% | 0.00 | 100.00 | |

The 15-24 year old age group experienced the largest percentage of spinal cord injuries in 2008, 22.9 percent (n = 32), as was the case in 2007, 31.1 percent (n = 32). In five percent of the 140 cases the age was not reported. These are not shown on the table. The “Other” category in the table on this page includes Asians, Hispanics, and other racial/ethnic origin.

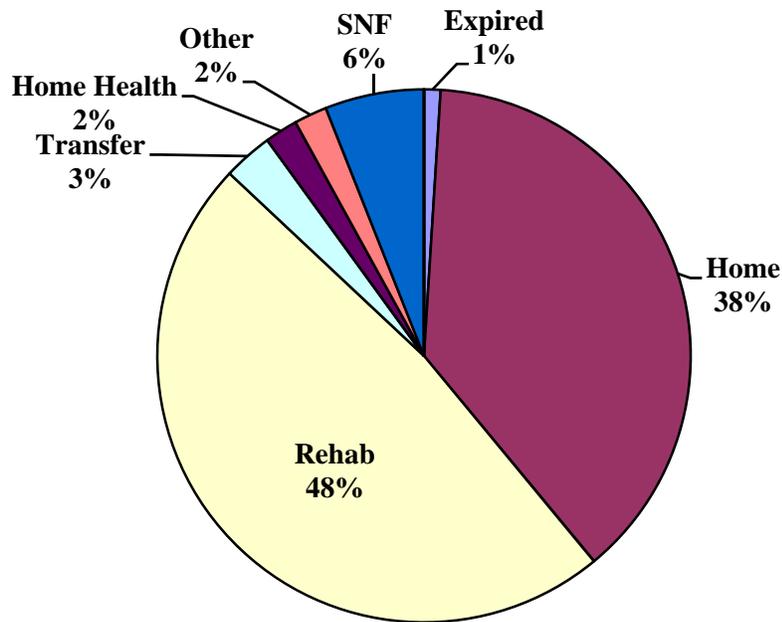
Table 4
2007 SCI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 103)

| Age | White Males | White Females | Black Males | Black Females | Other Males | Other Females | Total | % Total |
|----------------|--------------------|----------------------|--------------------|----------------------|--------------------|----------------------|---------------|----------------|
| <5 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1.0% |
| 5 to 14 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1.9% |
| 15-24 | 14 | 5 | 11 | 1 | 0 | 1 | 32 | 31.1% |
| 25-34 | 8 | 3 | 6 | 2 | 0 | 0 | 19 | 18.5% |
| 35-44 | 3 | 3 | 6 | 1 | 0 | 0 | 13 | 12.6% |
| 45-54 | 10 | 1 | 5 | 0 | 1 | 0 | 17 | 16.5% |
| 55-64 | 5 | 2 | 1 | 0 | 0 | 0 | 8 | 7.8% |
| 65-74 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1.0% |
| 75-84 | 2 | 3 | 0 | 2 | 0 | 0 | 7 | 6.8% |
| >84 | 2 | 1 | 0 | 0 | 0 | 0 | 3 | 2.9% |
| Total | 45 | 19 | 29 | 8 | 1 | 1 | 103 | 100.00% |
| % Total | 43.7% | 18.4% | 28.2% | 7.8% | 1.0% | 1.0% | 100.00 | |

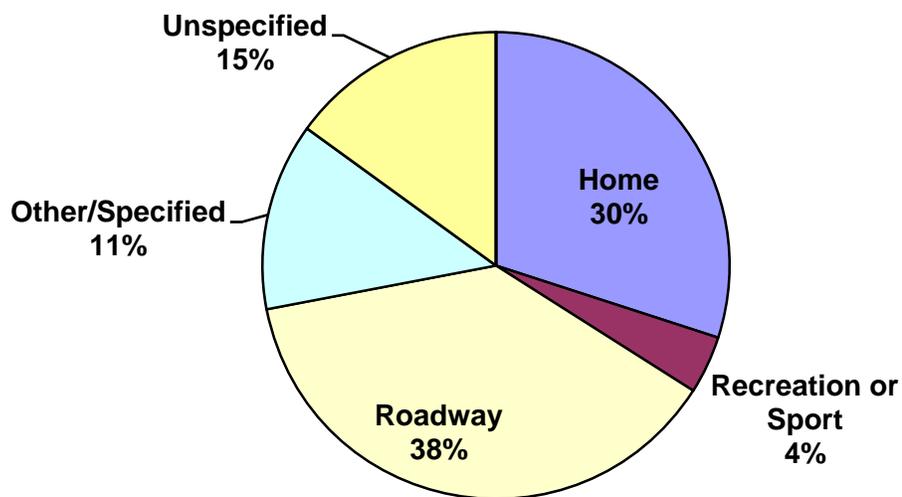
Figure 11
Discharge Disposition Following SCI Cases

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 100)



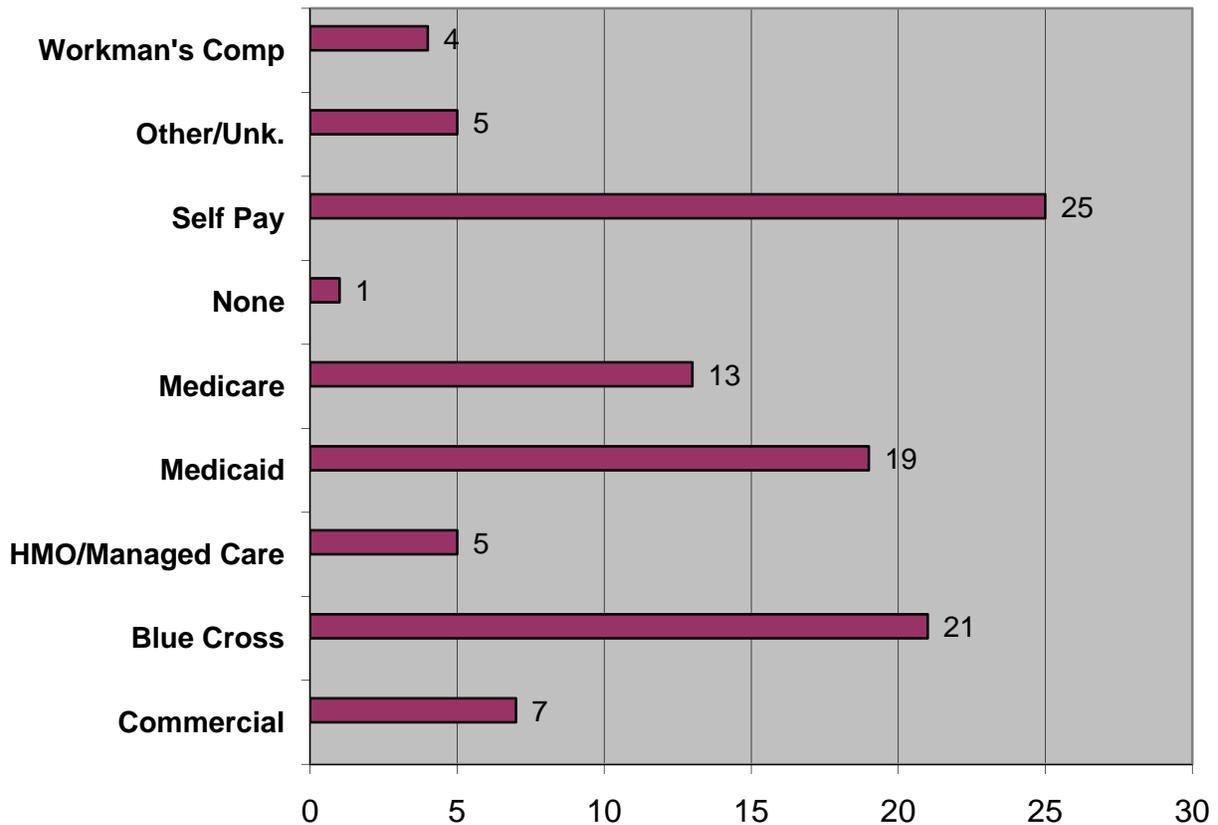
Forty-eight percent (n = 48) of SCI cases went to residential rehabilitation facilities and six percent (n = 6) went to skilled nursing facilities (SNFs). Thirty-eight percent (n = 38) were discharged home. Two percent (n = 2) were referred to home health services. Three percent (n = 3) were transferred to other acute care facilities. One percent (n = 1) of SCI cases expired.

Figure 12
Site of Injury Occurrence in SCI Cases
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 100)



Most spinal cord injuries, thirty-eight percent (n = 38), reported to the ATR occurred on streets and highways. Thirty percent (n = 30) occurred in private residences. Four percent (n = 4) in places for sports and recreation. Fifteen percent (n = 15) had no injury setting documented. The remaining eleven percent (n = 11) were in various other specified settings.

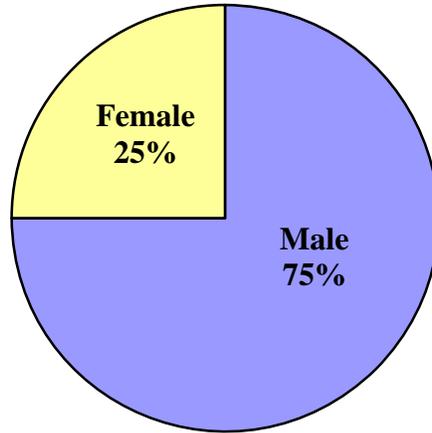
Figure 13
Payer Source for SCI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 100)



The injured individuals or their families, the most frequent primary reimbursement source for SCI cases, paid in 25 percent (n = 25) of cases. For the first year since SCI reporting to the ATR began, Blue Cross/Blue Shield was not the most frequent primary payment source. They covered 21 percent (n = 21) of documented SCI's in 2008. Medicare and Medicaid were the primary payers in 13 percent (n = 13) and 19 percent (n = 19), respectively. The primary payer was private commercial insurance in seven percent (n = 7) of cases. Workman's compensation was the primary payer in 4 percent (n = 4) of cases. Managed care and/or HMO's were the primary payers in five percent (n = 5). There was no payment in one percent (n = 1) and the primary payer was not known in five percent (n = 5).

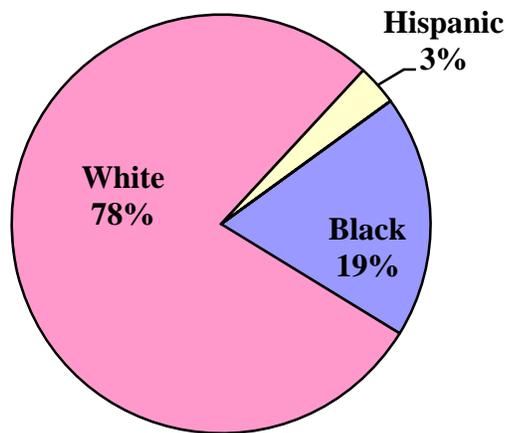
Cases with Both Head and Spinal Cord Injuries

Figure 14
Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 64)



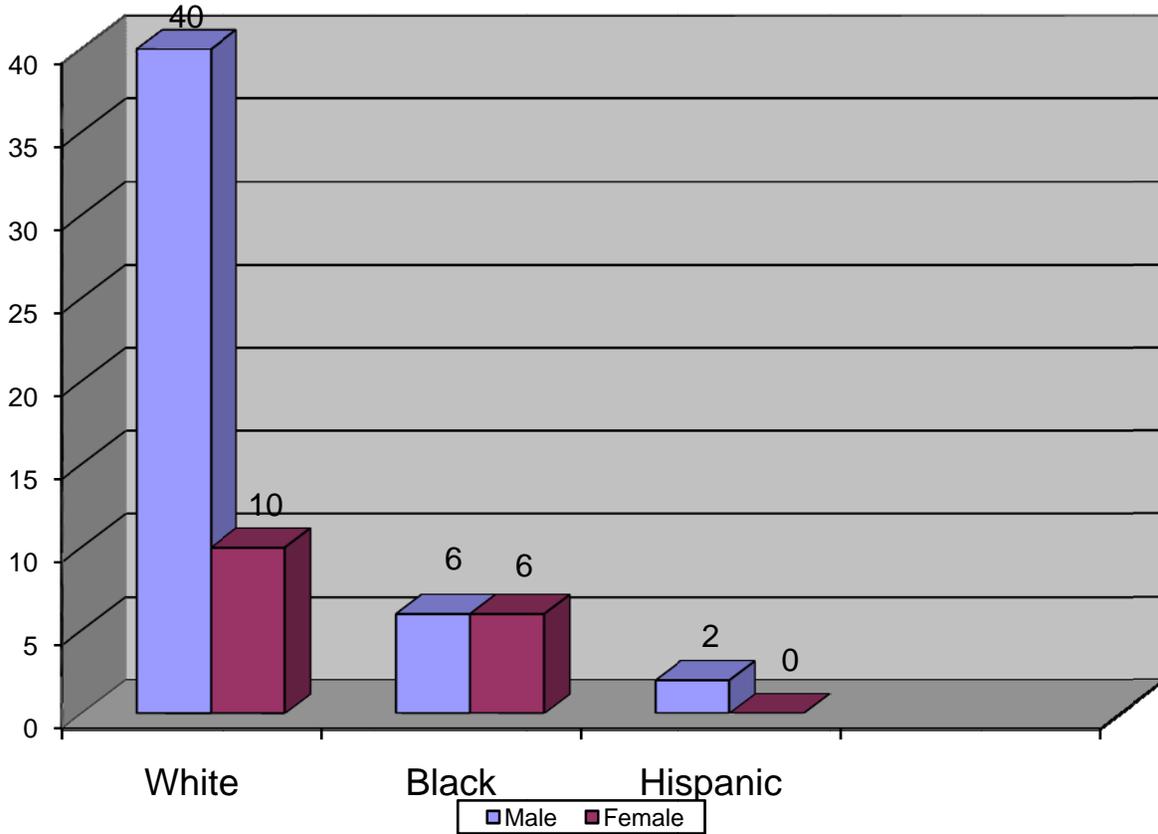
There were 3.0 times more male cases (n = 48) with simultaneous head and spinal cord injuries than female cases (n = 16) reported to the Alabama Trauma Registry for calendar year 2008.

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, 2008 – December 31, 2008
(n = 64)



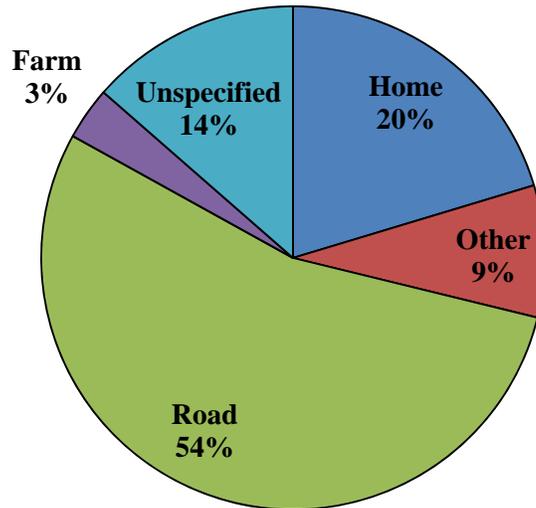
Whites constitute 78 percent (n =50) of the cases with both head and spinal cord injuries, Blacks 19 percent (n = 12), and Hispanics 3 percent (n =2).

Figure 16
Number of Cases with Both TBI and SCI by Gender and Race
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2008 – December 31, 2008
 (n = 64)



Eighty percent (n = 40) of cases with both head and spinal cord injuries in whites were male, fifty percent (n = 6) in Blacks were male, and both Hispanic cases were male. The overall percentages in this injury type were 75 percent male and 25 percent female (see Figure 14).

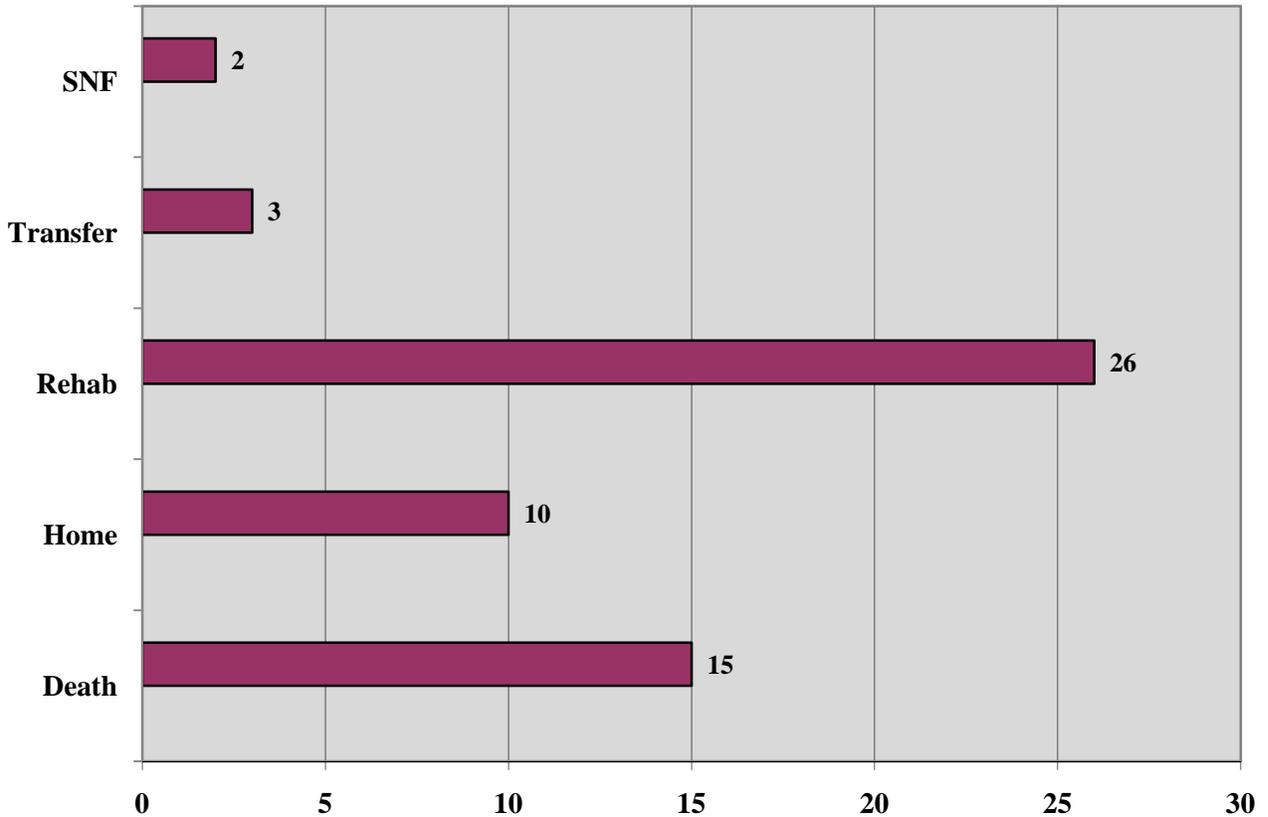
Figure 17
Site of Injury Occurrence in Cases with Both TBI and SCI
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 59)



Fifty-four percent (n = 32) of ATR cases that had both TBI and SCI occurred on streets and highways. Twenty percent (n = 12) occurred in the home. Three percent (n = 2) occurred on farms. Nine percent (n = 5) occurred in other specified places. The place of injury was not specified in fourteen percent of cases (n = 8).

Figure 18
Discharge Disposition Following Cases with Both TBI and SCI

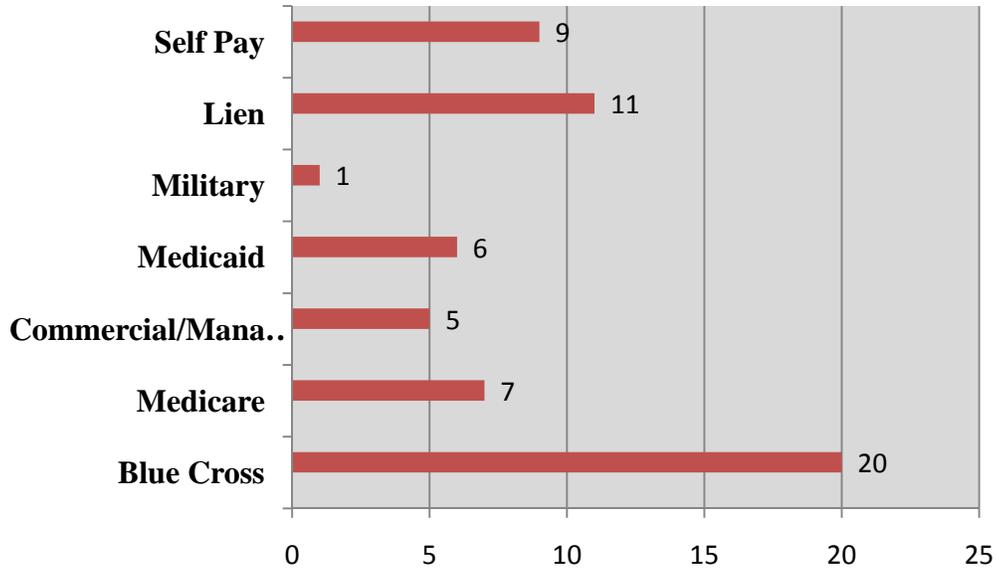
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2008 – December 31, 2008
(n = 59)



Twenty-six cases (44 percent) were discharged to residential rehabilitation facilities. Ten (17 percent) were discharged home. Fifteen cases (25 percent) with both head and spinal cord injuries died. Notably, this is the highest percent of mortality among all three categories. Reported cases who had both TBI and SCI Two (3 percent) were discharged to skilled nursing facilities (SNFs). Three (5 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, 2008 – December 31, 2008
(n = 59)



Blue Cross/Blue Shield paid in 20 cases (34 percent) that had both head and spinal cord injuries. Individuals or their families paid for their own medical care in 9 cases (15 percent). The source of payment in seven cases (12 percent) was Medicare and Medicaid in six cases (10 percent). Compensation was documented as “lien” in eleven cases (18 percent). Commercial insurance and managed care companies paid in five cases (8 percent). Military insurance was the primary payer in one case (2 percent).