

A PROFILE OF WAKE COUNTY CHILDHOOD INJURY &

INJURY PREVENTION

MAY 2014

Section II - Methodology

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II. Methodology

A. Introduction

To complete the *Wake County Childhood Injury Prevention Assessment Project*, UNC Team members completed four primary data collection and analysis activities:

1. An in-depth review of currently available secondary data sources about childhood injury mortality and morbidity among Wake County children ages 0 through 17 years, inclusive;
2. The identification and survey of organizations, coalitions, networks, and taskforces currently working in Wake County to address childhood injury and violence prevention;
3. A comparison between the leading causes of injury identified by the secondary data and the degree to which organizations participating in this project are addressing those causes of injury; and
4. A review and summary of evidence-based practices for the leading causes of intentional and unintentional injury identified through secondary data.

Data collection for these activities were aligned with terminology used by the Centers for Disease Control and Prevention (CDC) and the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) to create 12 primary categories for unintentional and intentional injury causes (Appendix A). The standardization of terminology allowed for consistent presentation, review, and discussion of similarities, differences, and gaps among the project activities completed for the *Wake County Childhood Injury Prevention Assessment Project*.

B. Wake County Injury and Violence Secondary Data

1. Secondary Data Collection

Data on childhood injuries in Wake County were acquired from six secondary data sources, including both data from publicly available sources and data obtained through consultation and under data use agreements with the respective data owners. For all data sources, we restricted the age range to include only 0 through 17 year olds to maintain our emphasis on childhood injuries.

The data collected for the *Wake County Childhood Injury Prevention Assessment Project* addresses a wide spectrum of injury severity including data regarding: 1) Mortality; 2) Hospital Discharges; 3) Emergency Department (ED) Visits; 4) calls to the Carolinas Poison Center; 5) Emergency Medical Services (EMS) Responses; and 6) Population Estimates (Table 1). Six and in some cases seven years of data were included for analysis in this project. Only four years of data were available for Wake County EMS.

These data sources should be considered complementary, and not mutually-exclusive, since some injured children receive care in multiple health care settings. Take, for example, a child who accidentally ingested a household chemical; her parents may have called the poison center and then taken her to the emergency department where she was ultimately hospitalized. That single injury event would contribute data as a poison center call, an ED visit, and a hospital discharge, with each data source including slightly different information. On the other hand, a child who was the victim of a fatal assault who died before receiving any medical attention would only be counted in the mortality data, and not appear in any of the other data sources. These data sources are not linked, making it virtually impossible to determine which records are continuations of care for records from another data source. While linking data sources offers the possibility of tracking the course of care for injured children across multiple levels, it is a challenging process due to the lack of common identifiers across secondary data sources. Most ED visits do not result in admission to the hospital and most hospital admissions do not result in death. Thus, each data source gives a different perspective on childhood injury in Wake County.

Table 1. Overview of data sources for childhood injuries in Wake County, NC.			
Data Type	Data Source(s)	Availability	Years
MORTALITY			
1. Mortality	State Center for Health Statistics	Publicly available	2006-2011
	NC Violent Death Reporting System	Consultation with NC Injury and Violence Prevention Branch, NC Division of Public Health	
MORBIDITY			
2. Hospital discharges	NC Hospital Discharge System	Consultation with NC Injury and Violence Prevention Branch, NC Division of Public Health	2006-2011
3. ED Visits	NC Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT)	Data use agreement	2006-2012
4. Poison Control Center Calls	Carolinas Poison Center (via NC DETECT)	Data use agreement	2006-2012
5. Emergency Medical Service responses	Wake County EMS (via NC DETECT)	Data use agreement	2009-2012
OTHER			
6. Population estimates (by age group and sex)	State Demographics branch, NC Office of State Budget and Management	Publicly available	2010-2012

For mortality data, deaths were considered injury-related if they had an International Classification of Diseases, Tenth Revision (ICD-10) external cause of mortality code (V01-Y98). For this report, injury-related mortality data exclude deaths due to adverse events/medical complications/medical misadventures (n=2).

Hospital discharge data include information about all hospital stays, such as patient demographics, diagnoses, external cause of injury, patient disposition at discharge, expected payment source, length of stay and hospital charges. The hospital from which the patient was discharged is not available in these data. Hospital discharge data were not directly available for analysis by our project team. Thus, we were limited to requesting data runs through NC Department of Public Health (NC DPH) staff. As a result, we were unable to get sub-mechanism analyses completed for this report. In addition, all cell sizes less than 10 are required to be masked to prevent the inadvertent identification of injury victims.

Injury related hospital discharges were identified based on ICD-9-CM codes for injury. The presence of *either* an external cause of injury code (E-code) of E000.x – E999.x *or* an injury diagnosis code of 800.xx – 999.xx resulted in inclusion in our analyses. Unlike emergency department visit data, hospital discharge data for North Carolina include only one external cause of injury code (E code) for each record. A single E-code makes it easier to work with these data but also limits the amount of information available for indentifying and describing injury related hospitalizations.

For Emergency Department visit data, we included visits made by patients who either *resided* in Wake County (i.e., county of residence is recorded as “Wake County”) or visited a hospital emergency department *located* in Wake County. Injury related ED visits were identified by ICD-9-CM diagnosis and E-codes in the same way described previously for hospital discharges.

ICD-9-CM external cause of injury (E-codes) were critical to our efforts to describe childhood injury in Wake County. The E-code is used to describe the *circumstances* of the injury event, while the diagnosis codes describe the physical injury. For example, a patient with a diagnosis of a fractured femur could have E-codes

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that tell us the injury occurred at home (E849.0) when he fell off a ladder (E881.0) while gardening and landscaping (E016.1). A summary and *Fact Sheet* describing E-codes is included in Appendix B.

The E-codes describe the circumstances of injury in several ways. For this report, the three most important are intent, mechanism and sub-mechanism of injury. The mechanism of injury E-codes are divided into three main *intent* categories: 1) Unintentional, 2) Intentional, and 3) Undetermined. The intentional category has two main sub-categories of intent: a) Assault and b) Self-Inflicted/Self-harm. Undetermined intent is used to indicate that the clinician could not determine if the injury was inflicted intentionally or unintentionally. In this study, Undetermined intent was most often used for poisonings. Mechanism of injury categories are generally broad, with sub-mechanisms providing more detail within each mechanism. There is, however, some variation in how broad and specific the various code levels are. Table 2 provides some examples of mechanisms and sub-mechanisms within each intent category.

Table 2. Examples of levels of external cause of injury codes (E-codes).		
<i>Injury Intent</i>	<i>Injury Mechanisms (examples)</i>	<i>Injury Sub-Mechanisms (examples)</i>
Unintentional (Accidental)	Falls (E880-E888)	Fall from stairs or steps (E880.x) Fall from ladder (E881.0) Fall from playground equipment (E884.0) Fall from bed (E884.4) Fall from skateboard (E885.2) Fall in sports (tackle) (E886.0)
	Motor Vehicle Traffic (MVT) Accidents (E810-E819)	MVT involving collision with motor vehicle, injured person=passenger (E812.1) MVT involving collision with pedestrian, injured person=pedestrian (E814.7) MVT involving collision on highway, injured person =motorcycle driver (E815.2)
	Accidental Poisoning (E850-E869)	Poisoning by other non-narcotic analgesics (E850.7) Poisoning by anti-depressants (E854.0) Poisoning by soap products (E861.1) Poisoning by herbicides (E863.5) Poisoning by other specified foods (E865.8) Poisoning by cosmetics (E866.7) Poisoning by unspecified carbon monoxide (E868.9)
Intentional Assault – Injury Purposely Inflicted by Other Persons (E960-E969)	Fight, Brawl, Rape (E960.x)	Unarmed fight or brawl (E960.0) Rape (E960.1)
	Assault by poisoning (E962.x)	Poisoning – drugs/medicinal substances (E962.0) Poisoning – other gases/vapors (E962.2)
	Assault by Firearms/Explosives (E965.x)	Assault by handgun (E965.1) Assault by letter bomb (E965.7)
	Assault by Other/Unspecified Means (E968.x)	Assault by blunt or thrown object (E968.2) Assault by human bite (E968.7) Other specified means (E968.8)
Intentional Self-Harm - Suicide and Self-Inflicted Injury (E950-E959)	Self-Inflicted Poisoning (E950-E952)	Poisoning - tranquilizers/ psychotropic agents (E950.3) Poisoning – other gases/vapors (E952.8)
	Hanging, Strangulation, Suffocation (E953.x)	Hanging (E953.0) Unspecified means (E953.9)
	By Firearms, Air Guns, Explosives (E955.x)	Self-inflicted injury by shotgun (E955.1) Self-inflicted injury by air gun (E955.6)
	By Other/Unspecified Means (E958.x)	Self-inflicted injury by burns/scalds (E958.1) Self-inflicted injury by electrocution (E958.4)

Table 2. Examples of levels of external cause of injury codes (E-codes).		
<i>Injury Intent</i>	<i>Injury Mechanisms (examples)</i>	<i>Injury Sub-Mechanisms (examples)</i>
Undetermined	Poisoning (E980-E982)	Poisoning by tranquilizers/psychotropic agents (E980.3) Poisoning by arsenic (E980.8) Poisoning by motor vehicle exhaust (E982.0)
	Falling From High Place (E987.x)	From residential premises (E987.0) From other man-made structure (E987.1)
	Other/Unspecified Means (E988.x)	Crashing of motor vehicle (E988.5) Unspecified means (E988.9)

An example of the complexity of the injury coding system is the set of codes used for motor vehicle crashes. Detailed decision trees govern the coding of factors such as the type of vehicle (e.g. car, truck, motorcycle), the people injured (e.g. drivers, passengers, pedestrians), the nature of the collision (e.g. collision with other motor vehicle, collision with other object), and the whether or not the incident took place in traffic. The data sources that we accessed had varying specificity with regard to the level of detail available on motor vehicle crash related injuries. In deciding how to combine or separate the detailed motor vehicle crash categories, we have balanced the specificity of the data available and the need to suppress small cell sizes under our data use agreements.

The following technical notes are important when considering the Wake County childhood injury data:

1. A data quality review of the Wake County emergency department visit data indicated that injury E-codes were not being submitted for most visits for the period from January-June 2010. As a result, the numbers of injury-related ED visits in this report represents an underestimate of the true incidence for that six month period. When calculating *rates* for ED visits, the 2010 data year was excluded.
2. Under the coding guidelines of the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), adverse effects and medical misadventures are reported with External Cause of Injury codes (E-codes). For this report, we have excluded ED visits, hospital discharges, and deaths due to adverse effects or medical misadventures since these are not relevant to the types of intervention work that the John Rex Endowment is pursuing.
3. Child maltreatment and neglect is not readily identified in secondary health data sources due to limitations in the codes available to describe medical encounters and the fact that, while maltreatment and neglect often lead to medical conditions, they are not necessarily a medical condition in themselves. To address this important issue, codes indicating a perpetrator of abuse and codes including neglect were used to identify child maltreatment and neglect related ED visits and deaths.
4. While all the data considered for this report are from secondary data sources, the ED visit data in NC DETECT are more directly available to the CCHI staff who worked on this project. The data are owned by NC Division of Public Health but CCHI staff, under a contract between NC DPH and UNC-CH, works to develop and maintain the ED visit data for public health use. Thus, the ED visit data are well known to our team and we have actively worked at insuring the quality of these data. One example of this is that the ED visit data include up to five E-codes per record while the hospital discharge database is limited to only one E-code per record. More in-depth analyses of mechanism of injury within the ED visit data are therefore presented.

The Carolinas Poison Center (CPC) provides a 24/7 service to field calls from the entire state of NC. These calls can be from parents, healthcare providers or individuals with concerns or questions about actual or potential exposures of various types of potentially poisonous materials. These calls are answered by trained Specialists in Poison Information who collect standardized and thorough information, entered directly into a computerized data system. Follow-up calls are made by CPC staff members to caregivers to track the condition of children with exposures of concern and updates are made to the data records based on further information collected through these follow-up calls. CPC call data, including updates, are provided to NC

DETECT hourly for public health surveillance purposes. For this project, a Data Use Agreement was obtained to access CPC call data for Wake County children through NC DETECT. All calls reported to NC DETECT for the years 2006-2012 in which the patient was a child age 0-17 years and the residence was Wake County were included for analysis.

Emergency Medical Services (EMS) data includes all EMS responses made by the Wake County EMS system, even if these runs are to addresses incidents across the Wake County border. A Data Use Agreement was established between Wake County EMS and CCHI to allow access to Wake County EMS data available in NC DETECT. Data for Wake County EMS responses for children ages 0-17 years for 2009-2012 were provided for analysis. In addition, we worked with Wake County EMS to request an EMS Pediatric Trauma Care Toolkit report from the Emergency Medical Services Performance Improvement Center (EMSPIC). The report covered the years 2011-2012 and children ages 0-15 years. Information from this report was used where applicable.

Appendix B contains additional information about these data sources, including a description of ICD-9-CM E-codes.

2. Secondary Data Analysis

Descriptive statistics and cross-tabulations were computed using SAS version 9.2 and Microsoft Excel. For mortality, hospital discharges, and emergency department visits, injury intent and mechanism were categorized based on ICD-9-CM (ED and hospital) or ICD-10 (mortality) external cause codes (Appendix B). Rates were computed using mid-year population estimates for 2010-2012 as the population denominators.

In both the ED visit and hospital discharge data, some observations had multiple injury-related ICD-9-CM diagnosis codes or E-codes. Specifically, hospital discharge records contain up to 9 diagnosis codes and 1 E-code each, while the ED visit records contain up to 11 ICD-9-CM diagnosis codes and five E-codes each. In our analysis, we used various approaches to determine which code to treat as the primary injury-related reason for the hospital discharge or ED visit, for different presentations of the data, as follows:

- **First-listed:** For some tables, we used only the first-listed injury-related diagnosis or E-code; in these instances, we first scanned and categorized the full set of diagnosis or E-codes to determine which ones were injury-related, then we selected the first *injury-related* code listed for that medical record, even if non-injury-related codes appeared earlier in the record.
- **Adjudicated for Intent and Mechanism:** Since the ED visit records contain up to 5 E-codes, there were some instances where there were multiple intent, mechanism, and/or place of occurrence codes. In most cases, all of the codes were consistent with each other, but in other cases, there were conflicting intent or mechanism codes. For these 2,152 records (1.6%) we conducted an adjudication review to try to determine which intent or mechanism code to treat as the *primary* reason for the visit. This review included a review of the diagnosis codes, E-codes, patient age, and two free-text fields: triage notes and chief complaints. The triage notes and chief complaints were helpful in ascertaining the context in which the injury occurred. We did not modify or re-assign any cases to intent or mechanism categories that were not already present in the original codes for that record, although there were some instances where such changes seemed warranted, such as records that seemed to indicate child maltreatment but were coded with "unintentional" intent E-codes or poisoning cases coded as "undetermined intent" when the intent seemed evident. If the additional information available for review was insufficient to determine the appropriate intent and mechanism code for the record, we assigned the first listed code. The end result of this adjudication process was to assign each record to one intent and one mechanism from the conflicting intents and/or mechanisms included in their multiple codes.
- **Adjudicated for Sub-Mechanism:** To describe ED visits for injury at the sub-mechanism level, all records with multiple E-codes were reviewed by hand and assigned to one sub-mechanism. Decision

rules followed included first, taking the sub-mechanism code related to the mechanism assigned based on the adjudication for intent and mechanism; second, taking specific codes over unspecific codes; and third, taking the first listed code if none of the other processes resulted in a single sub-mechanism code.

For Carolina Poison Center (CPC) call data, substance groupings and clinical effects codes provided by CPC were used to describe the exposures and clinical symptoms reported. Medical outcome codes, including level of effect (none, minor, moderate, major), were used to describe the severity of the exposures.

EMS data did not include clear coding to identify injury related calls and responses. Dispatch complaints indicative of injury were examined, as were Provider Primary Impression codes for “traumatic injury” and “poisoning/drug ingestion.” Unfortunately, many potentially useful variables in the EMS data were missing for large proportions of the records, limiting the potential utility of these data.

For the final analysis step, we rank-ordered the top five injury causes occurring in each of the three main data sources (mortality, hospital discharge, and emergency department visits) to develop a list of the ten leading causes of injuries occurring among Wake County children ages 0-17. We conducted sub-analyses for these leading injury causes to identify specific mechanisms and sub-mechanisms of injury, estimated hospital charges, and source of payment. The inclusion of only five leading causes of injury per primary data source was due to the number of events becoming too small to identify the top 10 injury causes of deaths and hospitalizations. To comply with our data use agreements, all frequency counts of 1-9 are masked in presentation of the hospital discharge and ED visit data to protect against potential identification of injured patients. Additionally, small counts in aggregate data covering several years are notoriously unstable and thus we felt should be avoided in the summary top ten causes of injury for this report.

In identifying the leading causes of childhood Injury in Wake County, we drew causes from various levels in relationship to the E-codes. “Assault” and “Self-Inflicted/Self-Harm” are intent level categories of injury and incorporate all mechanism and sub-mechanism codes within each intent category. Within the “Unintentional” intent category, we chose some injury mechanisms (Falls, Burns, Struck by/against, Natural/environmental factors, and Suffocation) as well as some sub-mechanism level causes (Motor vehicle crash - occupants, Motor vehicle crash - pedestrians, and Bicycle injury/crashes).

While this approach created some challenges in working with the various data sources, we felt it was appropriate to get beyond the confinements of the injury coding structures to try to address the real injury issues in the community. Furthermore, each of our main data sources presented different coding issues and challenges. For example, the mortality data were coded using ICD-10, which has a completely different structure than ICD-9-CM. However, the relatively few childhood injury deaths in Wake County made it possible to review each code used for these deaths and assign it to an appropriate cause category. The hospital discharge data are limited to only one E-code and are missing any E-code for more than 10% of those with an injury diagnosis. The Wake County ED visit data often have 3-5 E-codes per record, presenting a wealth of detail but requiring hand review and sub-categorization for many records that had conflicting codes (e.g. intentional unarmed fight and unintentional human bite; unintentional fall and unintentional cutting/piercing instrument). In these cases, reading the information available in the chief complaint and triage note fields, along with reviewing the diagnosis codes and the age of the child usually provided enough information to choose which injury intent and mechanism codes to use. When efforts to determine the most appropriate codes failed, we used the first listed mechanism and intent codes. A similar approach was used for determining sub-mechanism assignment when multiple conflicting sub-mechanism codes were present (e.g. Fall from slip/trip/stumble and Fall from stairs/steps).

C. Profile of Wake County Organizations Addressing Childhood Health and Safety

1. Survey Data Collection

a. Selection/Identification Process for Profile Organizations and Coalitions

To initiate the process of creating a Profile of Wake County organizations addressing childhood health and safety, UNC Team members developed a ‘Master List’ of organizations, networks, coalitions and taskforces, hereafter referred to as “coalition(s)”, identified through online searches (Appendix C). Entities were included in the list if they met the following criteria: 1) identified as an organization or a coalition and not an individual; 2) work in Wake County; and 3) conduct activities which may be relevant for the JRE Childhood Injury Profile.

The initial identification process was intentionally broad and included organizations or coalitions that were directly or indirectly working on childhood injury and/or violence prevention. For example, organizations working on teen job skill development were considered to be indirectly working on related protective prevention factors for injury and/or violence.

As the list of organizations was refined, several were removed for various reasons, including: they were addressing a one-time target group; they targeted unrelated age groups (e.g. adult men, elder populations); their work was/could be accounted for by other participating organizations; they served populations outside of Wake County; they consisted solely of online information; they were not currently providing services; JRE requested removal; there was no available contact information and they were not responsive to follow up contact; they asked to be “self-removed”; and/or they provided a duplicated entry.

Information collected about organizations was compiled into a working data base, which was continually revised and updated between August and October 2013. Additional internet research and professional contacts provided primary (e.g., Executive Director, CEO) and secondary (e.g., Assistant Director, Program Manager) names and emails for listed organizations and coalitions. A few organizations were added based on suggestions by organizations completing the survey. The final number of organizations identified and invited to participate in this project was 154. The final number of networks/coalitions/task forces identified and invited to participate in this project was 18.

b. Survey Development

Team members determined that primary data collection using an on-line survey was the most appropriate method to collect information about organizations working in Wake County to promote childhood health and safety, with a focus on those that conduct injury and/or violence prevention activities.

The organization survey development process consisted of three phases: 1) UNC identification of survey questions (e.g. organizational demographics, target populations); 2) review and alignment by JRE staff and evaluation consultants (e.g. definition of organizational capacity and identification of capacity building activities); and 3) pilot-testing and finalization of survey instrument.

The organization survey included 27 questions (Appendix D) and the coalition survey included 23 questions (Appendix E). Each survey included questions about organizational demographics, populations served, focus of work and types of services, types of injury and/or violence prevention activities, capacity, data and funding sources used, topics of interest for further support, and a question about whether they would like to be included in future reports/announcements from JRE. During the first phase of survey development, UNC identified the need to create a separate tailored survey instrument for coalitions (i.e., a coalition survey). This was determined due to the subtle but important differences between the organizational structure and focus of

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coalitions, networks, or task forces that seek to advocate for childhood health and safety, as compared to organization that conduct work to prevent childhood injuries. The coalition survey was comparable to the organization survey. The two main differences were: 1) Coalitions were asked to report on the frequency (e.g. monthly, quarterly) and method(s) (e.g. email, in person) of meetings; and 2) Coalitions were not asked to name or quantify their Childhood IVP Programs/Activities.

Tables 3 to 5 summarize three main areas of questions included in the John Rex Endowment Organization Survey conducted in September and October of 2013: 1) Demographics and Outreach; 2) Injury Prevention Focus of Organizations; 3) Organizational Resources. For each area, we summarize: a) the category (Column 1); b) the survey question number and number of survey items included (column 2); c) response options or specific indicators (column 3); and d) related response formats and scales (column 4).

Table 3. Organization demographics and outreach. ^a			
Category of Questions	Survey Item #	Response Options	Response Format/Scale
1. Organizational Demographics	#4 (n=3)	<ul style="list-style-type: none"> • # Employees • # of Full Time Employees • # Volunteers 	TEXT
2. Organization Type	#5 (n=10)	<ul style="list-style-type: none"> • Committee/Task Force • Local Government • Hospital/Health Center • Non-profit • Private • Religious Organization • Research • State Government • Volunteer Organization • Other 	Check all that apply (0-No; 1= Yes)
3. Geographical Area Served	#6 (n=6)	<ul style="list-style-type: none"> • The City of Raleigh • Wake County • The Greater Triangle Area • The State of NC • Nationally, The United States • Other (e.g. neighborhoods, cities, towns) 	Check all that apply (0-No; 1= Yes)
4. Populations Served ^b	#7 (n=16)	<ul style="list-style-type: none"> • African American • American Indian • Caucasian • Hispanic • Female • Male • Lesbian, Gay, Bisexual, Transgender • Rural • Urban • Homeless • Low income • Foster Children • Orphans • Children/youth living with a disability (e.g. cognitive, sensory, physical) • Refugees • Other 	Check all that apply (0-No; 1= Yes) No response was counted as not working in this area.
5. Targeted Groups Served	#8 (n=8)	<ul style="list-style-type: none"> • Children • Parents/Caregivers • Religious Leaders • Teachers • Medical Professionals (e.g. doctors, nurses, EMT) • Policy Makers/Decision Makers (e.g. commissioners, government officials) • Public Safety (e.g. police, fire) • Other 	Check all that apply (0-No; 1= Yes)

^a Coalitions were asked all question included in this table (#1 - #5).

^b Percentages were created based on those who indicated targeting a populations, those who were non-responders were considered to not be targeting that population.

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Table 4. Injury prevention focus of organization. ^a			
Category of Questions	Survey Item #	Response Options	Response Format/Scale
6. Organizational Work Focus	#10 (n=9)	<ul style="list-style-type: none"> • Counseling • Organizational Work/Education • Advocacy • Research/Data • Program Evaluation • Communication/Media • Writing Rules or Policies • Funding • Other 	Not at all important (0) to Very Important (6)
7. Importance of Childhood health and safety	#12 (n=7)	<ul style="list-style-type: none"> • Consider overall work of organization 	Not at all important (0) to Extremely Important (7)
8. Intentional Injuries	#14 (n=6)	<ul style="list-style-type: none"> • Child Abuse/Maltreatment (physical, sexual, emotional) • Assault/Physical Violence • Sexual Violence (e.g. assault, rape) • Self Inflicted/Self Harm • Intentional Injuries /Bullying • Human trafficking 	Check all that apply (0-No; 1= Yes)
9. Unintentional Injuries	#15 (n=14)	<ul style="list-style-type: none"> • MVC-Bicycles • MVC-Cars/trucks/buses • MVC-Motorcycles • MVC-Pedestrians • MVC-Other • Animal bites • Bicycle injury/crashes (NOT MVC) • Burns, including fire and scalds • Drowning/submersion • Environmental Factors (e.g. weather related) • Falls • Suffocation • Firearm • Poisoning/overdose 	Check all that apply (0-No; 1= Yes)
10. Childhood IVP Programs/Activities	#16	<ul style="list-style-type: none"> • How many (#) childhood health and safety programs or activities are provided at your organization? 	Numerical Value
11. Name/description of “TOP FIVE” Programs and Activities	#17	<ul style="list-style-type: none"> • Names of programs 	TEXT

^a Coalitions were not asked to name or quantify their Childhood IVP Programs/Activities, therefore question categories 10 and 11 were not asked of coalitions.

Table 5. Organizational resources. ^a			
Category of Questions	Survey Item #	Response Options	Response Format/Scale
12. Organizational Capacity	#19 (n=8)	<ul style="list-style-type: none"> • Research and identify evidence-based injury prevention programs, interventions, strategies • Use research about evidence-based injury prevention programs • Find relevant childhood injury data • Use childhood injury data • Identify possible funding/in-kind sources • Obtain funding/in-kind contributions • Identify other Wake County entities • Use existing Wake County injury prevention networks 	No Capacity (1) to High Level of Capacity (4); or 5 - Don't Know 6 - Not Applicable

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Table 5. Organizational resources. ^a			
Category of Questions	Survey Item #	Response Options	Response Format/Scale
13. Data Sources	#20 (n=14)	<ul style="list-style-type: none"> • We do not use data in our organization • Center for Disease Control and Prevention (CDC) • Kids Count Data Center • Carolinas Poison Control • Emergency Medical Service Performance Improvement Center (EMSPIC) • NC DETECT • NC Department of Transportation • NC Violent Death Reporting System • NC Division of Public Health (including the State Center for Health Statistics) • UNC Highway Safety Research Center • UNC Injury Prevention Research Center • Wake County Safe Kids • Wake County Community Health Assessment • Other 	Check all that apply (0-No; 1= Yes)
14. Project Funding Sources	#21 (n=17)	<ul style="list-style-type: none"> • Center for Disease Control and Prevention (CDC) • Department of Justice, Office of Juvenile Justice and Delinquency Prevention (OJJDP) • Federal Block Grant • Health Resources and Services Administration's (HRSA) Maternal and Child Health Bureau • National Foundations (The Robert Wood Johnson Foundation, Ford Foundation, Kaiser Permanente, etc) • National Highway Traffic Safety Administration (NHTSA) • NC Department of Health and Human Services (NC DHHS) • NC Foundations (John Rex Endowment, K.B. Reynolds, The Duke Foundation) • NC State Budget Allocation • Wake County Cooperative Extension • Wake County Department of Human Services • Wake County Department of Justice • Private Donors • Other Governmental Funding (federal, state or local) • Corporate Sponsors • Insurance Companies • Other 	Check all that apply (0-No; 1= Yes)
15. Capacity Building Activities	#24 (n=7)	<ul style="list-style-type: none"> • Receive resources related to childhood injury and injury prevention in Wake County • Receive Wake County childhood injury data reports • Participate with Wake County stakeholders working in injury prevention to dialogue about childhood injury priorities and networking • Attend trainings on evidence-based injury prevention programs, interventions, and strategies • Attend trainings focused on building capacity in resource development • Participate in informational networking sessions on injury prevention grant funding available from the John Rex Endowment and/or other public and private funders • Other 	Not Valuable (1) to Very Valuable (4)

^a Coalitions were asked all questions included in this table (# 12-15).

c. Survey Implementation

To establish contact with the 154 organizations and 18 networks/coalitions/task forces identified on the project's Master List, John Rex Endowment staff initiated contact by emailing invitations on September 16, 2013. Invited organizations and coalitions were asked to complete a Qualtrics survey (a link was included) by October 15, 2013. Email invitations included an individualized, tailored email addressed to the primary contact for each organization or coalition. Executive directors and CEOs were asked to forward the email to the most appropriate individual(s) within their organization. The email (Appendix F) included an introduction to the Wake County Childhood Health and Safety Injury and Violence Prevention Profile, a link to the Qualtrics survey; and contact information for a UNC team member.

UNC team members monitored the completion of surveys for organizations and coalitions on a daily basis. UNC sent up to four reminder emails to each organization until the contact either completed the survey or the final deadline passed.

2. Survey Data Analysis

a. Survey Data Processing

Information was collected and provided by Qualtrics in CSV format. Surveys that were initiated, yet did not contain data, were removed from the total count. Data were cleaned to be aligned with the appropriate formats (e.g. numerical, text). Data were summarized using Microsoft Excel 2007 for appropriate measures, including sums, averages, and frequencies. In some cases, data were used to generate new variables, such as composite scores for related information. All data management processes were documented and are summarized in a final code book (Appendix G).

Analysis of responses to two survey questions (Appendix D, Question #14, and Question #15) was conducted by reviewing similarities and differences across 22 (excluding 'none of the above') individual injury causes categories for both intentional and unintentional injury. Summaries for individual injury causes categories (e.g., suffocation, assault) were created based on survey responses from organizations indicating that they work either directly or indirectly to prevent an injury causes. Data were summarized using Microsoft Excel 2007 for appropriate indicators, including sums, averages, and frequencies. In some cases, data were used to generate new variables, such as composite scores for related information. Injury causes with evident differences are reported in the results section.

b. Coding to Assess Organizational Capacity and Program Impact (for Organization survey only)

UNC Team members conducted additional analysis of survey data to better estimate **Organizational Capacity** and **Program Impact**. UNC staff identified survey questions that related to organizational capacity and program impact. Upon review of responses provided to the survey questions, additional follow-up was conducted (online, and through telephone contact with the organization) to obtain missing information pertaining to capacity and impact.

To assess **Organizational Capacity**, UNC developed a capacity index. Participating organizations responded to items (Table 5 and Question #19 in Appendix D) related to organizational capacity to conduct activities to promote childhood health and safety through the prevention of injury and/or violence.

JRE wanted to assess the degree to which organizations can identify resources (e.g. locate evidence based practices; find childhood injury data; identify funding sources; and identify other local childhood injury and/or violence prevention networks) and integrate resources (e.g. use evidence based practices in injury prevention

programs; use childhood injury data; obtain funding; and use existing local childhood injury and/or violence prevention network).

Response options included “no capacity” (1), “low level of capacity” (2), “medium level of capacity” (3) and “high level of capacity” (4). To reduce missing variables, “Don’t know” and “Not Applicable” responses were substituted with the average response calculated from the responding organizations. This step was applied to seven responding organizations with missing responses for one to five indicators.

Responses for the eight items creating the organizational capacity index ranged from the lowest possible capacity of eight points to the highest possible capacity of 32 points. Capacity index scores were reviewed and divided into three similar sized categories: 1) High Capacity (≥ 25 points); 2) Medium Capacity (≥ 21 , < 25); and Low Capacity (< 21). Indicators for the organizational capacity sub groups were reviewed and we reported differences greater than 10% from the overall average.

For **Program Impact**, respondents were asked to identify and list their “TOP FIVE programs, interventions or activities focused on childhood health and safety through the prevention of injury and/or violence” (Survey Item #17, Table 4 and Question # 17 Appendix D). The programs provided in response to this question were coded for injury prevention focus across the categories of intentional injury, unintentional injury, or both.

Several leading public health and/or injury and violence frameworks were considered to identify the most applicable program descriptors for injury and/or violence prevention. Some of these frameworks include the National Research Council (2009); National Center for Injury Prevention and Control, Division of Violence Prevention (2013); National Action Plan for Child Injury Prevention (2012); the North Carolina Institute for Medicine (2005); The Spectrum of Prevention (Cohen & Swift, 1999); An Agenda for Suicide Prevention in the United States (Caine, 2013); Charting the Waves of Prevention (Daro & Donnelly, 2002); Haddon’s Matrix (1970); A Public Health Approach to Children’s Mental Health: A Conceptual Framework (Miles, Espiritu, Horen, Sebian, & Waetzig, 2010); Flay et al. (2005) Standards of Evidence: Criteria for Efficacy, Effectiveness and Dissemination; and Frieden’s Health Impact Pyramid (2011). UNC applied a combination of these frameworks (Appendix H) to each program by coding the programs for attributes related to the frameworks.

Table 6 describes how framework descriptors were applied to the programs: 1) IP focus; 2) Prevention level; 3) Socio-ecological Framework; 4) Frieden’s Health Impact Pyramid; and 5) Three E’s of Injury Prevention. Two separate coders reviewed all programs listed by responding organizations and independently coded each program for the framework descriptors. Discrepancies were reviewed and reconciled through consensus. Distributions, frequencies and matrices were analyzed for similarities and differences. A program impact index variable was derived from summing the coded variables for the Socio-Ecological Framework, Frieden’s Health Impact Pyramid, and the Three E’s of injury prevention. Sums, averages, and frequencies were compared across frameworks.

Table 6. Application of injury prevention categories and frameworks to programs listed by responding organizations.

<i>Program Descriptors</i>	<i>Variable(s)</i>	<i>Response Format/Scale</i>
1. IP Focus ^a	<ul style="list-style-type: none"> • 1- Intentional • 2 - Unintentional • 3- both 	Descriptive Numerical Value (1-3)
2. Prevention level ^a	<ul style="list-style-type: none"> • 1-Primary Prevention • 2-Secondary Prevention • 3-Tertiary Prevention • 4-Primary & Tertiary • 5-Primary & Secondary • 6--Secondary & Tertiary • 7-All Levels of Prevention 	Descriptive Numerical Value (1-7)
3. Socio-Ecological Framework	<ul style="list-style-type: none"> • 1-Individual • 2-Relationship • 3- Community • 4- Society 	Lower Impact (1) – Higher Impact (4)
4. Freidan’s Health Impact Pyramid	<ul style="list-style-type: none"> • 1 - Counseling and Education • 2 - Clinical Interventions • 3 - Long Lasting Protective Interventions • 4 - Changing the Context • 5 - SES Factors 	Lower Impact (1) – Higher Impact (5)
5. 3Es of Injury Prevention	<ul style="list-style-type: none"> • 1- Education • 2- Enforcement or Engineering • 3 - Combination of two Es • 4- All 3Es 	Lower Impact (1) – Higher Impact (4)

^aIP focus and level of prevention were included as descriptive information. They are not included in the program impact index.

c. Analysis of Program Impact by Organizational Capacity Levels

Program impact sums, averages and frequencies were compared across organization capacity levels. Distributions by frameworks were also reviewed. We reported differences greater than 10% from the overall average.

D. Relationship among the Leading Causes of Childhood Injury, Injury Prevention Focus, and Programmatic Approach

UNC conducted additional analyses comparing the leading causes of injury to the degree to which organizations that participated in this project address those causes of injury. Information collected in the survey of organizations identified those organizations that self-identified as working to prevent specific types of intentional or unintentional injury (Table 4). We summarized which injury categories and types were more frequently addressed by organizations responding to the survey. In addition, we characterized the organizational capacity by injury causes. To guide the comparisons, we used our terminology (Appendix A) to align the secondary data analysis with the organization survey data (Table 7).

Table 7. Alignment between leading childhood injury causes from secondary data and survey data.

<i>Rank</i>	<i>Leading 10 Events and Injuries</i>	<i>Categories from Survey</i>
1	MVC Traffic-Occupant	1. MVC-Cars/Trucks/Buses
2	Assault	2. Assault a. Child Abuse/Maltreatment (physical, sexual, emotional) b. Assault/Physical Violence c. Sexual Violence (e.g. assault, rape)
3	MVC Traffic-Pedestrian	3. MVC-Pedestrians
4	Self-Inflicted/ Self-Harm	4. Self Inflicted/Self Harm
5	Falls	5. Falls
6	Unintentional Suffocation	6. Suffocation
7	Burns	7. Burns, including Fire and Scalds
8	Struck By or Against	8. Not available
9	Natural/Environmental Factors	9. Environmental Factors (e.g. weather related) a. Animal Bites
10	Bicycle Injury/Crashes	10. Bicycle Injury/Crashes

E. Compilation of Evidence-based Practices for Childhood Unintentional and Intentional Injury

UNC conducted a literature review to identify evidence-based programs for the leading causes of injury in Wake County. UNC staff conducted online reviews and searches for evidence based or best practices registries. Due to the difference in known causes and prevention methods for intentional and unintentional injury-related events, a combination of 16 registries was used (Table 8).

Table 8. Injury and/or violence prevention evidence-based or best practice registries.	
Registry Name	Sponsoring Agency
Intentional Injury	
1. Blueprints for Healthy Youth Development	University of Colorado Boulder; Institute of Behavioral Science Center for the Study and Prevention of Violence; In partnership with the Annie E. Casey Foundation
2. California Evidence-Based Clearinghouse for Child Welfare	The Office of Child Abuse Prevention (California)
3. National Institute of Justice Office of Justice Programs, Crimesolutions.gov	National Institute of Justice, US Department of Justice
4. National Registry of Evidence-Based Programs and Practices (NREPP)	Substance Abuse and Mental Health Services Administration (SAMHSA)
5. Office of Juvenile Justice and Delinquency Prevention (OJJDP), Model Programs Guide	Office of Justice Programs, National Institute of Justice, US Department of Justice
6. Promising Practices Network	National Institute of Justice, US Department of Justice
Unintentional Injury	
7. CDC's Morbidity and Mortality Weekly Report, Injury-Control Recommendations: Bicycle Helmets	The Centers for Disease Control and Prevention (CDC)
8. CDC Motor Vehicle Safety Resources - Teen Drivers, Policy Impact	The Centers for Disease Control and Prevention (CDC)
9. Children's Safety Network	Health Resources and Services Administration's Maternal and Child Health Bureau, U.S. Department of Health and Human Services
10. Coalition for Evidence-Based Policy	The Coalition is a nonprofit, nonpartisan organization, and has no affiliation with any programs or program models. Their work is primarily funded by philanthropic foundations, including the John D. and Catherine T. MacArthur Foundation, the William T. Grant Foundation, the Laura and John Arnold Foundation, and the Annie E. Casey Foundation.
11. Child Injury Prevention Tool Selecting Best Practices	<u>Stage One:</u> The Child Death Review Capacity-Building Project was based at the Harborview Injury Prevention and Research Center in Seattle, Washington. The project was supported by a grant from Health Resources and Services Administration, through its EMS-C Targeted Issues Grant Program (1H34MC02543-01-033) <u>Stage Two:</u> National Center for Child Death Review and the Children's Safety Network Project: grant No. 1 U93 MC 00225-01 and grant No 05-381.0.03.01 from the Maternal and Child Health Bureau (Title V, Social Security Act), Health Resources and Services Administration, Department of Health and Human Services.
12. National Association of County & City Health Officials (NACCHO)	NACCHO is funded by many agencies http://www.naccho.org/about/partners_funders.cfm
13. National Center for Injury Prevention and Control (NCIPC)s	The Centers for Disease Control and Prevention (CDC)

Table 8. Injury and/or violence prevention evidence-based or best practice registries.	
Registry Name	Sponsoring Agency
14. The Cochrane Collaboration	Cochrane’s funding model reflects the international and dispersed nature of the organization. While their core income (income paid directly to Cochrane and used to sustain its information management system, research programs, website etc) comes principally from the proceeds of The Cochrane Library and other Cochrane products, their groups are supported by national governments, international governmental and non-governmental organizations, universities, hospitals, private foundations, and personal donations. They are not permitted to accept funding from commercial organizations such as pharmaceutical companies. This is to ensure that the conclusions of Cochrane Reviews are not influenced by commercial interests.
15. United States Preventive Services Task Force (USPSTF)	Agency for Healthcare Research and Quality (AHRQ)
Both Intentional and Unintentional Injury	
16. CDC’s The Community Guide	The Centers for Disease Control and Prevention (CDC)

In 2013, Blueprints for Healthy Youth Development created a list of intentional injury programs and interventions and their ratings from several leading federal and private agencies (Mihalic, 2014). Building from this initial list of programs, the evidence-based practices compilation was created for this project to include information from SAMHSA’s National Registry of Evidence-Based Programs and Practices (NREPP) registry. NREPP’s structural framework was adopted to organize information for reviewed injury and/or violence interventions listed in the compilation. The evidence-based practices Compilation prepared for this project includes information for interventions, programs and/or activities that address youth-related injury and/or violence prevention. When available, the evidence-based practices Compilation developed for this project includes 18 descriptors: registry source; the criterion rating assigned by the registry; basic program description; extended program description; review date; primary source website; additional resources; manual; published articles; specific outcomes; notes; age groups; setting; and availability in Spanish (Table 9).

Table 9. Evidence-based practices compilation variable description and format/scale.		
Intervention Description	Variable Description	Format/Scale
1. Program Name	The name of the strategy or program as identified by the reviewer or source.	Text
2. Evidence-Based Reviewers and Ratings	Citation of the source of evidence-based reviews of the strategy/program and specific rating.	Text
3. Basic description	A brief description of the program/strategy	Text
4. Extended Description	A longer and more detailed description of the program/strategy	Text
5. Review Date	Date/year of review by the primary source	Month/Year
6. Primary Review Website	Link to primary source	Hyperlink
7. Additional Resources	Link to additional information about the strategy/program (e.g. other sources, the developer of the program, or technical assistance for implementers).	Hyperlink
8. Program Manual	Link to manuals or guides	Hyperlink
9. Published Articles	Link to published articles/bibliographies	Hyperlink
10. Specific Outcomes	Major injury outcome categories by the primary source. If no outcomes were explicitly stated, then the injury category for the strategy/program was included as the specific outcome	Category from NREPP/identified by Review of Abstract

Table 9. Evidence-based practices compilation variable description and format/scale.		
<i>Intervention Description</i>	<i>Variable Description</i>	<i>Format/Scale</i>
	(e.g., MVC injuries and fatalities for MVC interventions).	
11. Outcome Categories	General categories of outcomes, from primary reviewer and based on NREPP's categories. Several interventions addressed risky sexual behavior (e.g. early pregnancy, unprotected sexual intercourse) and therefore we included this as an additional risk factor category.	Category from NREPP/identified by Specific Outcome categories
12. Notes	Any additional information that may be readily available about a specific strategy/program (e.g. adaptations, available translations of materials, limitations on availability and replication).	TEXT
13. Spanish	Indicates whether or not the program has necessary materials that are readily available in Spanish.	1=Yes
14. Risk Factors for Injury and Violence	These categories represent major outcomes that are addressed by many childhood injury and violence prevention programs. These outcomes represent risk factors for unintentional and intentional injury types. This list is not comprehensive, but helps to describe the nature of many youth-focused programs available. Some programs only address risk factors, some programs only address specific injury types, and some programs may address both risk factors and specific injury types.	<ol style="list-style-type: none"> 1. Alcohol 2. Crime/Delinquency 3. Drugs 4. Mental Health 5. Family Relationships 6. Social Functioning 7. Substance Abuse 8. School Readiness/Academic Achievement 9. Risky Sexual Behavior
15. Intentional Injury Event	These categories were identified to align with the injury causes from the organization survey. Several programs were selected for other injury types (e.g. unintentional and intentional), but the evaluation level for all injury causes selected varies.	Table 4, #8 and #9
16. Unintentional Injury Event		
17. Age Group	Age categories, as defined by NREPP, were coded based on the sources' explicit indication when possible or based on the source's language in describing the program. Age categories were applied to the target of the program, e.g. the category of the individuals or groups whose behavior the strategy/program addresses.	<ul style="list-style-type: none"> • Early Childhood (0-5) • Childhood (6-12) • Adolescent (13-17) • Young Adulthood (18-25) • Adult (26-55) • Universal (e.g. laws, mass media)
18. Setting	Setting categories, as defined by NREPP, were coded based on the source's explicit indication when possible or based on the source's language in describing the strategy/program. A separate setting category was created for community-wide interventions (e.g. laws and mass media campaigns).	<ul style="list-style-type: none"> • School • Home • Workplace • Residential • Outpatient • Correctional • Primary Care • Other or Unspecified • Universal (e.g. laws, mass media)

Programs (including interventions and countermeasures) were reviewed and included if they addressed an intentional and/or unintentional injury event or risk factor. The same injury and violence categories from the survey were used in the compilation to code programs. In addition, many programs addressed risk factors for injury and violence and we identified these in the compilation by using NREPP's outcome categorizations.

NREPP identified outcome categories include the following eight risk factors: 1) alcohol; 2) crime/delinquency; 3) drugs; 4) mental health; 5) family relationships; 6) social functioning; 7) substance abuse; and 8) school readiness/academic achievement. Several interventions addressed risky sexual behavior (e.g. early pregnancy, unprotected sexual intercourse) and therefore we included this as an additional risk factor category. Targeted age groups and program setting (e.g. school, home) information was also coded.

Using Microsoft Excel, summaries and matrices were created and used to describe the range of interventions that could be implemented to reduce the relevant injury cause(s). The final Evidence-based compilation is a searchable database.

Each registry used to create the compilation includes a rating system for the programs they selected for review. Registries did not use a standardized system and therefore there is variation in the rating, criteria, quality and terminology of reviewed programs. For this project, reviewed programs are reported as listed by the source registry. Source registry criteria for categories such as *Recommended*, *Promising*, *Unproven*, *Harmful*, *Insufficient Evidence* to *Recommended Against* vary. Detailed definitions of the ratings used by each source registry are in Appendix I. Most registries require a specific level of scientific rigor to be included in the review; however, there is also variation in the review process used by each registry. For example NREPP provides their ratings based on several independent trained reviewers evaluating the following: 1) reliability of measures; 2) validity of measures; 3) intervention fidelity; 4) missing data and attrition; 5) potential confounding variables; and 6) appropriateness of analysis, whereas the Community Guide convenes a coordination team to lead a review process overseen by the Community Preventive Task Force Members appointed by the director of the Center for Disease Control and Prevention. We have provided a summary of the ratings used in the compilation in Appendix I.