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Morbimortalidade em crianças e adolescentes vítimas de acidentes automotivos

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Campina Grande - PB
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Dissertação apresentada à Universidade Estadual da Paraíba - UEPB, em cumprimento aos requisitos necessários para a obtenção do título de Mestre em Saúde Pública, Área de Concentração Saúde Pública.

Orientador: Prof. Dr. Alessandro Leite Cavalcanti

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DEDICATÓRIA

À Bianca, minha esposa, pelo incentivo e apoio durante a realização de mais uma conquista da minha vida.

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RESUMO

LINO, Thiago Henrique de Araújo. **Morbimortalidade em crianças e adolescentes vítimas de acidentes automotivos**. Dissertação (Mestrado em Saúde Pública) - Universidade Estadual da Paraíba, Campina Grande, 2014.

Objetivo: Estudar a morbimortalidade decorrente de acidentes automotivos em crianças e adolescentes. **Material e métodos**: Um primeiro estudo consistiu de uma revisão sistemática da literatura em quatro bases de dados (Scielo, Medline, Scopus e Web of Science) envolvendo artigos relacionados à associação entre condições socioeconômicas e ambientais e acidentes automotivos envolvendo crianças e adolescentes. Também foi desenvolvido um estudo seccional no Instituto Médico Legal de Campina Grande-PB, coletando informações de crianças e adolescentes, de suas lesões e dos acidentes no período de janeiro de 2008 a dezembro de 2011. Aplicou-se estatística descritiva e inferencial (α=5%). **Resultados**: Na revisão sistemática, dos 748 artigos identificados, 28 foram considerados elegíveis inicialmente e, desses, 6 atenderam aos critérios de inclusão. Apesar das fragilidades metodológicas identificadas, verificou-se associação entre fatores socioeconômicos individuais e/ou contextuais e acidentes automotivos. No estudo seccional, dos 1613 prontuários analisados, 232 (14,4%) eram referentes a crianças e adolescentes vítimas de acidentes automotivos. As lesões na cabeça ocorreram com maior frequência em crianças com idade entre 0 e 4 anos (53,8%, RP = 5,065) e pedestres (30,4%, RP = 2,039), enquanto as lesões faciais e maxilofaciais foram identificadas em maior proporção entre as vítimas do sexo feminino (31,1%, RP = 0,489). **Conclusões.** Existe evidência de associação positiva entre baixa condição socioeconômica individual (renda, educação, desemprego) ou do contexto (privação social, mortalidade infantil, iniquidade de renda, violência) e a morbimortalidade decorrente dos acidentes automotivos. Os acidentes envolvendo motociclistas são mais prevalentes, afetando adolescentes masculinos de 15 a 19 anos, com maior frequência das lesões localizadas na cabeça e na face.

Palavras-chave: acidentes automotivos, crianças e adolescentes, morbimortalidade.

ABSTRACT

LINO, Thiago Henrique Lino. **Morbity and Mortality of children and adolescents injured by traffic casualties.** Dissertation (Master of Science in Public Health) - State University of Paraíba, Campina Grande, 2014

Objective: The aim of this work was to study the morbidity and mortality related to automotive accidents involving children and adolescents. **Methods:** The first study consisted of a systematic review in four databases (SciELO, MEDLINE, Scopus and Web of Science) involving related association between socioeconomic and environmental conditions and automobile accidents involving children and adolescents articles. A second study with cross-sectional design was carried out in the Forensic Institute of Campina Grande-PB, collecting information from children and adolescents, their injuries and accidents from January 2008 to December 2011. Descriptive and inferential statistics were applied (α=5%). **Results**: In systematic review of 748 articles identified, 28 were considered eligible, but six studies met the inclusion criteria. Despite methodological weakness identified, it was observed evidence on the association socioeconomic factors and automotive accidents. In sectional study, of 1613 reports analyzed, 232 (14.4%) were related to children and adolescents victims of automobile accidents. Head injuries occurred more frequently in children aged 0-4 years (53.8%, PR = 5.065) and pedestrians (30.4%, PR = 2.039), while face and maxillofacial injuries occurred in higher proportion among females (31.1%, PR = 0.489).
Conclusions. There is evidence of a positive association between low socioeconomic status individual (income, education, unemployment) or the context (social deprivation, child mortality, income inequality, violence) and the morbidity and mortality resulting from automobile accidents involving children and adolescents. Accidents involving motorcyclists are more prevalent, affecting male adolescents 15-19 years, with higher frequency of lesions in the head and face.

Keywords: automotive accidents, children and adolescents, morbidity and mortality.

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LISTA DE ABREVIATURAS E SIGLAS

BC – *British COlumbia*

BO – Boletim de Ocorrência

CAAE – Certificado de Apresentação para Apreciação Ética

CAPES – Coordenação de Aperfeiçoamento de Pessoal de Nível Superior

CDRU – *Child Death Review Unit*

CEP – Comitê de Ética em Pesquisa

CI – *Confidence Interval* (Intervalo de Confiança)

CID-10 – Codificação Internacional das Doenças

CNPq – Conselho Nacional de Desenvolvimento Científico

Coeff – *Coefficient*

CKSIs – *Children Killed or Seriously Injured*

CPCs – *Children Pedestrian Casualties*

GEMOL – Gerencia Executiva de Medicina e Odontologia Legal

IPC – Instituto de Polícia Científica

MEDLINE – US National Library of Medicine

MeSH – Medical Subject Headings

MOOSE – Meta-analysis of Observational Studies in Epidemiology

NUMOL – Núcleo de Medicina e Odontologia Legal

OMS – Organização Mundial da Saúde

OR – *Odds Ratio* (Razão de Chances)

PR – *Prevalence Ratio* (Razão de Prevalência)

PRISMA – Preferred Reporting Items for Systematic Reviews

RTI – *Road Traffic Injuries*

SD – *Standart Deviation* (Desvio Padrão)

SE – *Standart Error* (Erro Padrão)

SISNEP – Sistema Nacional de Ética em Pesquisa

SciELO – Scientific Eletronic Library Online

SPSS – Statistical Package for the Social Science

Stats 19 – *Police Official Records of Child Pedestrian Casualties*

UK – *United Kingdom*

WHO – World Health Organization

1 INTRODUÇÃO

1.1 MORBIMORTALIDADE EM CRIANÇAS E ADOLESCENTES POR CAUSAS EXTERNAS

As lesões por causas externas representam uma das causas mais prevalentes de morbidade e mortalidade na população pediátrica e de adultos jovens no mundo [1]. Estas lesões revelam, em particular, uma preocupação importante na saúde pública mundial [2] e, nos países industrializados, possuem uma associação com padrões sociais, liderando as causas de morte neste grupo etário [3,4,5,6].

Nas crianças, nos seus primeiros meses de vida, o trauma é a causa mais significativa de mortalidade e de morbidade, sendo responsável por mais mortes do que todas as doenças combinadas [7,8]. Devido a varias razões como, por exemplo, uma maior exposição, inexperiência, imaturidade, comportamentos, entre outros, os padrões de morbidade e mortalidade na infância estão mudando de doenças infecciosas às lesões externas, principalmente em países de baixa e média renda [9].

Altas taxas de lesões provenientes de causas externas têm sido encontradas em grupos com baixos níveis socioeconômicos em todo o mundo [10,11]. Acreditava-se, e ainda é acreditado por alguns autores, que os acidentes só aconteciam em países desenvolvidos, sendo resultados de fatores como: industrialização, tecnologia, modernização e motorização. Evidencia-se, no entanto, que estes acidentes também ocorrem em países em desenvolvimento[12].

Os custos socioeconômicos dos acidentes são, certamente, bem mais expressivos do que os custos com a sua prevenção, porém esses gastos geralmente não são levados em consideração. Além disso, existe um grande número de atividades de educação e prevenção desenvolvidas em várias partes do mundo que nunca foram avaliados, levando a grandes programas de eficácia duvidosa[12].

Milhares de crianças morrem a cada ano vítimas de acidentes ou violência, e milhões de outras sofrem as consequências de lesões não fatais, contribuindo para a perda de anos potenciais de vida. Quanto à morbidade, para cada morte de menor de 18 anos, estima-se que

existam 12 crianças internadas em hospital ou apresentando invalidez permanente e 34 crianças que necessitam de cuidados médicos ou que não foram à escola ou para o trabalho por causa de uma lesão [13].

A partir da década de 1980, as causas externas se configuraram como a segunda causa de morte no Brasil e a primeira para aqueles que se encontram entre cinco e 39 anos de idade [14].

A análise de dados mostra o grande impacto que elas determinam na vida e saúde da população. Segundo dados da Organização Mundial de Saúde (OMS), em 2003, os acidentes de trânsito lideraram as estatísticas mundiais de mortes por causas externas, seguido por homicídios. No Brasil, de acordo com o DATASUS, de janeiro de 2008 a junho de 2010, foram registrados 52.379 óbitos por esse tipo de causa, sendo 48,9% (25.640) na região Sudeste [15,16].

1.2 ACIDENTES AUTOMOTIVOS E SEUS DETERMINANTES SOCIAIS

Os acidentes de trânsito são um dos maiores problemas de saúde publica na sociedade moderna [17] sendo importantes e crescentes, mas negligenciados pela saúde pública global. Em 1998, os países em desenvolvimento foram os responsáveis por mais de 85% de todas as mortes em acidentes de trânsito e por 96% de todas as mortes infantis no trânsito no mundo inteiro [18].

Segundo a Organização Mundial da Saúde (OMS), os acidentes automotivos lideram a morbidade e mortalidade nas crianças ao redor do mundo, consistindo na maior causa de mortes na faixa etária de 5-14 anos em relação a todas as outras causas de mortalidades [19]. Nos países pobres da América Latina, são a sexta causa de mortes e a terceira de morbidade em todas as idades, tanto indivíduos adultos como crianças [20].

A existência de uma associação entre baixo nível socioeconômico e saúde é frequentemente proposta na literatura [21,22,23,25,25,26,27,28]. Publicações têm indicado que o aumento da incidência de lesões entre crianças é particularmente influenciado pela pobreza [29]. Crianças de classes sociais mais baixas têm aproximadamente quatro vezes mais chance de morrer em acidentes automotivos do que as crianças de classes sociais mais elevadas [30,31].

O nível socioeconômico é bem conhecido por ser um fator de risco para causas de lesões em geral e as lesões de trânsito não são exceção [32,33,34,35,36]. Estudos demonstram que indivíduos de grupos socioeconômicos desfavorecidos ou que vivem em áreas mais pobres

correm maior risco de serem mortos ou feridos como resultado de um acidente de trânsito, mesmo em países de alta renda. A evidência sugere que as explicações para essas diferenças devem ser procuradas em variações de exposição ao risco, em vez de comportamento [35], apesar de diferenças comportamentais desempenharem algum papel na etiologia dos acidentes. Mesmo nos países industrializados, os acidentes de trânsito como causas de mortalidade tem gradiente mais íngreme de classe social, particularmente no caso de crianças e adultos jovens [29,37].

Há vários indicadores que são amplamente utilizados para avaliar a situação socioeconômica como os níveis educacional e ocupacional, sendo dois dos mais comuns. Em um estudo de coorte da Nova Zelândia realizado na década de 1990, verificou-se que os motoristas com ocupações de baixo status e níveis mais baixos de educação tinham um risco maior de lesão, mesmo quando do ajuste para fatores de confusão[37]. Na Suécia, o risco de lesões para os peões e ciclistas foi entre 20% e 30% maior entre os filhos de trabalhadores manuais do que os dos funcionários mais altos assalariados [35].

A escolha do transporte nos países em desenvolvimento é frequentemente influenciada por fatores socioeconômicos, especialmente renda. No Quênia, por exemplo, 27% dos cidadãos que não tiveram nenhuma educação formal utilizavam a caminhada para os deslocamentos, 55% ônibus ou micro-ônibus e 8% viajavam em carros particulares usados. Em contraste, 81% daqueles com ensino de nível secundário geralmente viajavam em carros particulares, 19% de ônibus e nenhum utilizava a caminhada [38].

Em muitos países, os acidentes de trânsito são mais frequentes em áreas urbanas, sobretudo conforme aumenta a urbanização. No entanto, a gravidade da lesão geralmente é maior nas áreas rurais. Esse fato pode estar relacionado ao *design* da estrada e ao fluxo de automóveis nas áreas urbanas congestionando o trânsito, enquanto as condições nas zonas rurais permitem trafegar em velocidades maiores. Em países de baixa e média renda, acontece um menor número de acidentes nas áreas rurais, todavia os custos gerais para as famílias podem ser maiores quando eles ocorrem [39]. Em muitos países, há a preocupação com a vulnerabilidade das pessoas que vivem ao longo das estradas, uma vez que estas estradas são muitas vezes construídas em áreas onde já existe atividade econômica, criando assim potenciais conflitos por espaço entre os utentes da estrada e da população local [40].

Estimar o custo para a sociedade relacionado aos acidentes automotivos é importante por várias razões. Em primeiro lugar, é essencial para a conscientização da gravidade dos acidentes de trânsito como um problema social, segundo lugar, possibilitará comparações

adequadas entre acidentes de trânsito e outras causas de morte e de lesões. Além disso, uma vez que o custo social dos acidentes de trânsito é um reflexo dos benefícios sociais da redução de acidentes através de intervenções de segurança, as avaliações cientificas dos custos permitem elencar prioridade entre as diferentes intervenções a serem feitas, usando métodos de custo-benefício [41].

1.3 LESÕES ASSOCIADAS AOS ACIDENTES AUTOMOTIVOS

Dentro do contexto das lesões por causas externas, a região da cabeça é a mais afetada na população pediátrica [42,43,44], e pode ser associada com lesões graves, sequelas temporárias ou permanentes, sendo responsável por quase 90% de todas as mortes infantis [45]. Portanto, as lesões por causas externas são responsáveis por danos físicos, emocionais, sociais e econômicos, incluindo altas despesas com cuidados médicos [42,46]. A principal causa destas lesões acometendo a cabeça e a face na população infantil são os acidentes automotivos [47,48].

A prevalência destas lesões pode variar de 34,2% [42] a 57,8% [49]. Vítimas de acidentes automotivos podem sofrer múltiplas lesões incluindo as lesões maxilofaciais [50]. No Brasil, um estudo publicado demonstrou uma frequência de 50% de lesões na cabeça e 56,6% de lesões intraorais entre adolescentes vítimas deste tipo de acidente [47].

Fatores sociais, culturais e ambientais têm sido associados com os padrões de lesões de cabeça e maxilofaciais [48,51]. A literatura aponta algumas variáveis, incluindo o perfil das admissões hospitalares [42,49], o manejo clínico das lesões da cabeça [52] e os custos envolvendo o tratamento das vítimas [53,54].

No entanto, poucos estudos envolvem a avaliação dos fatores associados com as lesões da região da cabeça, especialmente as lesões maxilofaciais na população pediátrica [44,47,48]. Estudos têm identificado não somente os fatores envolvidos nestas ocasiões, mas também o ambiente social em que eles ocorrem, resultando numa maior visibilidade [49].

2 OBJETIVOS

2.1 OBJETIVO GERAL:

- Estudar a morbidade e a mortalidade decorrente de acidentes automotivos em crianças e adolescentes.

2.2 OBJETIVOS ESPECÍFICOS:

2.2.1 ARTIGO I:

- Identificar, por meio de uma revisão sistemática, os fatores socioeconômicos e ambientais associados aos acidentes automotivos que acometem crianças e adolescentes.

2.2.2 ARTIGO II:

- Determinar a prevalência das lesões de cabeça, face e maxilofaciais em crianças e adolescentes vítimas de acidentes automotivos em Campina Grande, Paraíba.
- Identificar fatores associados à prevalência das lesões de cabeça, face e maxilofaciais em crianças e adolescentes vítimas de acidentes automotivos em Campina Grande, Paraíba.

3 MATERIAL E MÉTODOS

3.1 ARTIGO I

3.1.1 TIPO DE ESTUDO

Trata-se de uma revisão sistemática, cuja metodologia foi desenvolvida de acordo com o protocolo para revisões sistemáticas, proposto pelo *Preferred Reporting Items for Systematic Reviews* (PRISMA) [55], e incluiu as seguintes etapas: estratégia de busca da literatura, seleção de estudos a partir de critérios de inclusão e exclusão, seleção dos artigos, extração de dados e avaliação da qualidade dos estudos selecionados.

3.1.2 ESTRATÉGIA DE BUSCA

A busca foi realizada utilizando quatro bases de dados: Medline, SciELO, *Web of Science* e Scopus. Dois examinadores previamente treinados por um profissional de biblioteconomia realizaram a pesquisa de forma independente, com o intuito de selecionar artigos publicados de janeiro de 2004 a março de 2014.

Foram definidos dois temas combinados pelo operador booleano "AND". Cada tema foi criado pela utilização do operador "OR" para pesquisar por palavras do título, resumo e palavras-chave utilizadas na indexação (MeSH *terms*). O primeiro tema foi criado para corresponder às condições socioeconômicas e ambientais e incluiu os seguintes descritores: "*socioeconomic factors*", ou "*economic indexes*", ou "*social conditions*", ou "*social inequity*", ou "*social class*", ou "*social environment*", ou "*life change events*". O segundo, relativo aos acidentes automotivos, incluiu os descritores: "*accidents*", ou "*accidents,traffic*", ou "*traffic accdents*", ou "*automobiles*", ou "*motorcycles*".

Nas bases SciELO, *Web of Science* e Scopus não foi possível utilizar filtros para restringir a busca pela idade (crianças e adolescentes), sendo acrescentado um terceiro tema, incluindo as palavras-chaves: child OR children OR adolescents OR teenagers. O Quadro 1 ilustra a estratégia de busca utilizada para cada uma das quatro bases incluídas nesta revisão.

Quadro 1. Estratégia de busca utilizada em cada base de dados.

Database	Key words	Filters applied
ISI Web of Science www.	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)	English language
PubMed http://www.ncbi.nlm.nih.gov/pubmed	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles)	Publication dates: 10 years Species: Humans Languages: English and Portuguese Ages: Child: birth-18 years
Scopus www.scopus.com/home.url	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)	Social Sciences English and Portuguese languages
SCIELO www.search.scielo.org	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change	Portuguese language

	events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)

3.1.3 CRITÉRIOS DE ELIGIBILIDADE

Esta revisão incluiu estudos clínicos e epidemiológicos (seccionais, caso-controle, coorte e estudos de prevalência) que apresentavam dados de prevalência/incidência referentes a acidentes automotivos acometendo crianças e adolescentes e que relacionaram tais acidentes aos determinantes sócio-econômico-ambientais. Foram analisados os artigos escritos originalmente na língua portuguesa e na língua inglesa e publicados de janeiro de 2004 a março de 2014. Foram excluídos estudos de revisão sistemática, relatos de casos (ou séries de casos), estudos em duplicata presentes em duas ou mais das bases pesquisadas, estudos demonstrando resultados repetidos de um mesmo estudo original, estudos que relacionavam condições socioeconômicas com várias injúrias ou que não apresentaram a análise de fatores socioeconômicos associados aos acidentes.

Os dois pesquisadores responsáveis pela busca realizaram, independentemente, uma triagem inicial dos artigos a partir da análise dos títulos e resumos. Dessa maneira, 28 artigos foram selecionados e seus textos completos recuperados para leitura cuidadosa, seguindo os critérios de elegibilidade com o intuito de selecionar aqueles que seriam analisados quanti e qualitativamente. Na ocorrência de divergência, um terceiro revisor foi consultado.

3.1.4 EXTRAÇÃO DOS DADOS

Os dados foram extraídos após leitura completa dos artigos pelos dois pesquisadores, respeitando os critérios de inclusão e exclusão. Foi utilizada uma padronização para extração dos dados que incluiu as seguintes informações:

- Autor (es) e ano de publicação
- Localização do estudo
- Tipo de estudo
- População/Amostra e período de avaliação
- Desfechos estudados
- Fatores sócios-econômicos e ambientais de interesse
- Relações significantes encontradas entre os fatores de risco e os desfechos

3.1.5 AVALIAÇÃO DA QUALIDADE METODOLÓGICA

A avaliação da qualidade dos estudos selecionados foi realizada, de forma independente pelos dois examinadores, a partir de um formulário elaborado com base nos itens propostos pelo *Meta-analysis of Observational Studies in Epidemiology (MOOSE) group* para avaliação da qualidade metodológica de um estudo [56], o qual é considerado um guia essencial para uma avaliação adequada dos estudos observacionais selecionados para revisões sistemáticas (APÊNDICE I). Para tanto, o documento original do MOOSE foi amplamente discutido pelos dois revisores, o que permitiu o treinamento dos mesmos, bem como a seleção dos itens que seriam considerados para a qualificação (critérios de elegibilidade e seleção da amostra, informações sobre a avaliação da exposição e do desfecho, fatores de confusão, vieses, métodos estatísticos e relato de limitações do estudo).

3.2 ARTIGO II

3.2.1 TIPO DE ESTUDO

O estudo foi do tipo documental e retrospectivo, com abordagem indutiva e procedimento descritivo, através da observação indireta utilizando fonte de dados secundários [57].

3.2.2 LOCAL DA PESQUISA

A pesquisa foi realizada no Instituto de Polícia Científica (IPC) do Estado da Paraíba, no Núcleo de Medicina e Odontologia Legal (NUMOL) em Campina Grande, PB. O NUMOL é um órgão componente do IPC do Estado da Paraíba, sendo subordinado a Gerência Executiva de Medicina e Odontologia Legal (GEMOL) e integrante da Polícia Civil Estadual.

3.2.3 POPULAÇÃO E AMOSTRA

A população do estudo compreendeu todos os laudos de lesão corporal, com seus respectivos boletins de ocorrência (BO) realizados entre os anos de janeiro de 2008 a dezembro de 2011 no NUMOL de Campina Grande, Paraíba. A amostra compreendeu 1.613 laudos que registraram dados envolvendo crianças e adolescentes vitimadas por acidentes automotivos, correspondentes a idade entre 0 a 19 anos, ocorrido no período citado no município de Campina Grande - PB.

3.2.4 INSTRUMENTO DE COLETA DE DADOS

O instrumento de coleta consistiu de um formulário específico desenvolvido mediante análise dos laudos e BO e utilizado previamente em outra pesquisa realizada no mesmo local de estudo [58]. O instrumento é composto por questões objetivas e subjetivas, dicotômicas ou de múltipla escolha (APÊNDICE II).

As variáveis de interesse do estudo estão elencadas no Quadro 2, juntamente com sua descrição, a classificação quanto à mensuração e ao plano de análise.

Quadro 2. Descrição das variáveis do estudo

Variável	Descrição	Categorias	Classificação quanto à mensuração	Classificação quanto ao plano de análise
Sexo	Totalidade das características nas estruturas reprodutivas.	1. Masculino 2. Feminino	Qualitativa nominal excludente	Independente
Idade	Tempo decorrido, em anos, desde o nascimento.	1. 0-4 anos 2. 5-9 anos 3. 10-14 anos 4. 15-19 anos 999. Não informado	Quantitativa ordinal excludente	Independente
Dia da semana	Período formado por sete dias.	1. Segunda 2. Terça 3. Quarta 4. Quinta 5. Sexta 6. Sábado 7. Domingo 999. Não informado	Qualitativa ordinal excludente	Independente

Acidentes de trânsito	Tipo de acidente ocorrido no tráfego ou envolvendo veículo.	1. Pedestre 2. Ciclista 3. Motociclista 4. Triciclo 5. Ocupante de veículo 6. Outros acidentes de transporte 888. Não se aplica 999.não informado	Qualitativa nominal excludente	Dependente
Quantificação das lesões	Número de lesões produzidas na vítima	1. Única 2. Múltiplas	Quantitativa nominal excludente	Dependente
Local do corpo atingido	Região do corpo atingida pelas lesões	1 Cabeça 2. Face 3. Pescoço	Qualitativa nominal	Dependente
Presença de fraturas	Ocorrência ou não de fraturas no corpo da vítima.	1. Sim 2. Não	Qualitativa nominal excludente	Dependente
Lesões Maxilofaciais	Ocorrência ou não de lesão no seguimento maxilofacial.	1. Sim 2. Não	Qualitativa nominal excludente	Dependente
Presença de Lesão na Cavidade Bucal	Ocorrência ou não de lesão na cavidade bucal.	1. Sim 2. Não	Qualitativa nominal excludente	Dependente

As variáveis ‘causas, tipos de acidentes de trânsito, local da injúria e autor da agressão’ foram categorizadas segundo a CID-10ª Revisão. Para as demais variáveis (tipo de lesão em tecido mole, tipos de ferimentos, lesões maxilofaciais e tipos de lesões maxilofaciais) a categorização seguiu o que foi definido por França [59].

3.2.5 PROCEDIMENTO DE COLETA DE DADOS

Os dados foram obtidos com base nos laudos de lesão corporal e seus respectivos BO do NUMOL de Campina Grande. Estes foram previamente analisados e

selecionados de acordo com as categorias que objetivam a pesquisa, constituindo o que Croce & Croce Júnior [60] denominaram de *corpus* documental.

Os dados foram coletados por dois pesquisadores. Previamente à coleta, os mesmos testaram o instrumento de pesquisa por meio de um estudo piloto objetivando verificar a inexistência de erros ou falhas [58].

Foram adotados como critérios de elegibilidade, os laudos que apresentavam como vítimas indivíduos entre 0 e 19 anos, acometidos por causas externas. Aqueles em que as faixas de idade não se inserissem neste intervalo ou apresentassem outras causas de morbidade e mortalidade, assim como o não registro destas variáveis, foram excluídos da pesquisa.

3.2.6 PROCESSAMENTO E ANÁLISE DOS DADOS

O programa estatístico utilizado para digitação, armazenamento dos dados e obtenção dos cálculos estatísticos foi o SPSS (*Statistical Package for the Social Sciences*) na versão 18.0.

Na análise dos dados foram utilizadas técnicas de estatística descritiva e inferencial. As técnicas estatísticas envolveram distribuições absolutas, percentuais e medidas estatísticas: média, mediana e desvio padrão. Nas técnicas e estatísticas inferenciais foram utilizados os testes Qui-quadrado de Pearson, ou Exato de Fisher quando as condições para utilização do Qui-quadrado não foram verificadas e intervalos de confiança para as variáveis média, prevalências e o *Odds Ratio* (Razão das chances). Os testes foram realizados com margem de erro de 5,0% e o intervalo com confiabilidade de 95,0%.

3.2.7 ASPECTOS ÉTICOS

O projeto de pesquisa foi registrado no SISNEP e submetido ao Comitê de Ética em Pesquisa (CEP) da Universidade Estadual da Paraíba, sob CAAE nº 0443.0133.000-

11 (ANEXO I). Os pesquisadores seguiram as observâncias éticas da Resolução 466/2012 do Conselho Nacional de Saúde, que trata sobre pesquisas com seres humanos. Além disso, buscou-se obedecer às normas da instituição onde se realizou a pesquisa, com vistas a preservar o material utilizado na coleta, bem como o não prejuízo à rotina de funcionamento do serviço.

4 RESULTADOS

ARTIGO I:

Socioeconomic determinants of automobile accidents involving children and adolescents: a systematic review*

ARTIGO II:

Head and maxillofacial injuries in children and adolescents victims of automotive accidents : a brazilian cross-seccional study**

**Elaborado a partir das normas da Revista BMC Public Health*

***Elaborado a partir das normas da Revista The Scientific World Journal*

ARTIGO I

Socioeconomic determinants of automobile accidents involving children and adolescents: a systematic review

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Abstract

Background. Children and adolescents are the main victims of unintentional injuries, including automotive accidents, and it is suggested that the incidence could be related to poor socioeconomic conditions of a given population. The aim of this systematic review was to identify and analyze the major socioeconomic and environmental factors that would be associated to automotive accidents involving children and adolescents.

Mehtods. Systematic literature search was performed in four databases (Scielo, Medline, Scopus and Web of Science) to select articles published in the last 10 years demonstrating association between socioeconomic and environmental conditions and automotive accidents involving children and adolescents using the following keywords: ["socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events"] AND ["accidents" OR "accidents, traffic" OR "traffic accidents" OR "automobiles" OR "motorcycles"]. The following data were collected: location and type of study, population / sample, evaluation period, outcomes and exposure factors, and other significant relationships found. The assessment of the methodological quality was based on the Meta-analysis of Observational Studies in Epidemiology (MOOSE) checklist (criteria for quality assessment) and the review is according to the protocol suggested by the Preferred Reporting Items for Systematic Reviews (PRISMA).

Results. Of 748 articles identified, 28 were considered eligible in the initial screening. After reading the text, six studies met the inclusion criteria. All of these showed positive association between some factors related to low individual socioeconomic status (income, education, unemployment) or context (social deprivation, child mortality, income inequality, violence) and morbidity and mortality resulting from automotive accidents involving children and adolescents. As for quality assessment, weaknesses were found in most articles (n = 5), mainly related to study size, potential source of bias, statistical methods and presentation of results.

Conclusions. Traffic accidents involving children and adolescents is a serious public health problem worldwide and are related to low socioeconomic status or to context in which these individuals are involved. However, scientific evidence regarding this association is still incipient and the risk factors are heterogeneous, requiring further studies with greater methodological rigor in different locations and different populations.

Keywords: Socioeconomic factors, automotive accidents, children and adolescents.

Background

Unintentional injuries affecting children and adolescents are a public health problem and represent the majority of cases of morbidity and mortality in this age group (0-18 years) worldwide [1]. In general, unintentional injuries result in non-fatal injuries, in which mortality is represented by a small proportion of these conditions [2]. In addition, these injuries cause physical, emotional, social and economic harm, including high cost of medical and hospital care.

Poor health conditions are an important issue for public health, and socioeconomic and health inequalities have been widely observed in children, adolescents and adults, although there is evidence of differences in socioeconomic factors in relation to mortality and morbidity of children and especially adolescents [3]. In many studies, most injuries involving this age group is found in areas of low socioeconomic level [1,3,4,5,6,7]. Children with poor social conditions are five times more likely to be at risk of injuries than children with better socioeconomic levels [8]. Although several studies contribute to the understanding of the relationship between poor socioeconomic status and mortality in adults, there are few studies that investigate the influence of these factors on mortality among children [9].

Automotive accidents involving children are a major problem in developing countries regarding the modernization of society [10]. These accidents have mortality rate corresponding to approximately 2% of all cases of yearly deaths worldwide [11]. Every day, around the world, 3,000 deaths occur due to traffic accidents [12], including accidents involving pedestrians, bicycles and motorcycles and automotive accidents involving children and adolescents. Thus, traffic accidents have become the leading cause of morbidity and mortality among children, resulting in 40% of fatalities involving individuals younger than 15 years of age [11].

This systematic review sought to enumerate the socioeconomic factors that are directly related to automotive accidents involving children and adolescents in an attempt to analyze the level of scientific evidence about the determinants of these injuries. Thus, this study may assist the planning of future research and support the development of programs and / or policies for the prevention of traffic accidents in this age group.

Methods

The methodology developed in this study is in accordance with the protocol for systematic reviews proposed by the Preferred Reporting Items for Systematic Reviews (PRISMA) [13], and included the following steps: literature search strategy, selection of studies based on inclusion and exclusion criteria, selection of articles, data extraction and quality assessment of selected studies.

Search strategy

The search was performed using four databases: Medline, SciELO, Web of Science and SCOPUS. Two examiners (THAL and BMS) previously trained and calibrated by a professional in librarianship conducted the research independently in order to select articles published from January 2004 to March 2014.

Two themes combined by Boolean operator "AND" were defined. Each theme was created by using the operator "OR" to search both words of title, abstract and keywords used in indexing (MeSHterms). The first theme was created to match the socioeconomic and environmental conditions and included the following terms: “socioeconomic factors”, or “economic indexes”, or “social conditions”, or “social inequity”, or “social class”, or “social environment”, or “life change events”. The second, related to automotive accidents, included the following descriptors: “accidents”, or “accidents, traffic”, or “traffic accidents”, or “automobiles”, or “motorcycles”.

In SciELO, Web of Science and Scopus databases, it was not possible to use filters to narrow the search by age group (children and adolescents), and a third theme was added, including the following keywords: child OR children OR adolescents OR teenagers. Table 1 shows the search strategy used for each of the four databases included in this review.

In order to identify relevant articles, references of selected articles (manual search) were also searched to find studies that had not been selected in the initial search, but no other study was identified in this manual search.

Inclusion and exclusion criteria

This review included clinical and epidemiological studies (cross-sectional, case-control, cohort and prevalence studies) that presented data on the prevalence / incidence

of automotive accidents involving children and adolescents and that related such accidents to socio-economic and environmental factors. Articles originally written in Portuguese and in English and published from January 2004 to March 2014 were included. Systematic review, case reports (or case series), studies demonstrating repeated results of the same original study, studies that related socioeconomic conditions with multiple injuries or those who failed to present the analysis of socioeconomic factors associated with accidents were excluded.

The same two examiners (THAL and BMC) responsible for the search independently conducted an initial screening of articles from the analysis of titles and abstracts. Thus, 28 articles were selected and their full texts were retrieved for careful reading by following eligibility criteria in order to select those who would be quantitatively and qualitatively analyzed. In the event of disagreement, a third reviewer would be consulted.

Data extraction

Data were extracted after reading the full articles by the two examiners (THAL and BMS), respecting the inclusion and exclusion criteria. Standardization was used for data extraction that included the following information:

• Author (s) and year of publication
• Location of the study
• Type of study
• Population / Sample and evaluation period
• Outcomes
• Socio-economic and environmental factors of interest
• Significant relationships found between risk factors and outcomes

Quality assessment

The quality assessment of selected studies was independently performed by two examiners using a form developed based on items proposed by the Meta-analysis of Observational Studies in Epidemiology (MOOSE) to assess the methodological quality of a study [14], which is considered an essential guide for proper assessment of observational studies selected for systematic reviews (Appendix1). The MOOSE items considered for qualification were: eligibility criteria and sample selection, information

on the assessment of exposure and outcome, confounding factors, biases, statistical methods and study limitations.

Results

The process of selection of articles for inclusion in this review is shown in the PRISMA flowchart (Figure 1). Initial research includes the screening of 748 articles by title and abstract, obtaining 28 potential articles and of these, 6 articles met the inclusion criteria [4,5,6,7,15,16]. The reasons for the exclusion of 22 articles were: one editorial article, one review article, one series of cases, three articles did not associate socioeconomic factors with automotive accidents, fourteen articles associated socioeconomic factors with various causes of child injuries, one article included adults, and one article conducted a survey of opinion among parents and / or guardians of children affected by automotive accidents.

Study characteristics

The six articles included in this review were published between 2004 and 2011. One article obtained data from official statistics of the World Health Organization concerning 19 countries (Austria, Belgium, Czech Republic, Denmark, United States, Finland, France, Germany, Hungary, Ireland, Italy, Turkey, Norway, Poland, Portugal, Spain, Switzerland, the Netherlands, and the United Kingdom) [4]; the other articles were from the United Kingdom [5,6,7], Peru [16] and Canada [15]. The age of children studied showed no definite pattern, with variations among studies, with minimum age of zero and maximum of twenty years. The outcomes studied were also heterogeneous, since one study evaluated mortality data concerning various types of automotive accidents (child as pedestrian, cyclist or passenger in automotive vehicle) [4]; three analyzed fatal and non-fatal pedestrian accidents [5,6,7], one studied only deaths [15] and another only nonfatal injuries [16] resulting from accidents involving pedestrians. Only one article was a case-control study [16], one ecological [4] and the others were cross-sectional or transversal. All articles associated socioeconomic factors with automotive accidents involving children and adolescents (Table 2).

Socioeconomic factors

All studies showed positive association between low socioeconomic status and morbidity and mortality related to automotive accidents involving children and adolescents. The main socioeconomic factors studied were: income, assistance income, parental unemployment, parental educational level (especially maternal) and crime. Income was characterized as a socioeconomic factor in four studies [4,5,6,16], and only one of them has analyzed income in the level of area, showing that the *per capita* gross national income was negatively correlated with the death of children in traffic, with the exception of accidents involving cyclists [4]. In a study conducted in the UK, it was shown that low income is a predictive factor for the incidence of accidents with pedestrian children, but this association was not demonstrated for the census sectors in the metropolitan area [5]. Green, Muir & Maher (2011) [6] also found no association between income and fatal or nonfatal injuries in children due to automotive accidents in two other English cities (Leeds and Bradford). The same evidence was demonstrated in research conducted in Peru in an urban poor district of Lima, where low family income was not significantly associated with accidents [16].

English families financially assisted by the government showed positive association with the incidence of severe or fatal pedestrian accidents [6], which was also demonstrated by Desaprya et al. (2011) [15], who despite studying a smaller sample and using only bivariate statistical analysis, found a significantly higher number of families receiving financial assistance affected by fatal automotive accidents involving children (18.2%) than would be predicted by the average levels of assistance (2.5%) in British Columbia, Vancouver, Canada. The same authors found that 12.1% of pedestrian children involved in fatal accidents have at least one unemployed parent. In a previous study [6], the increasing incidence of accidents with pedestrian children was positively related to the fact that parents have part-time jobs. However, Graham & Stephens (2008) [5] found no consistent relationship between unemployment / partial employment or educational level and the incidence of automobile accidents involving pedestrians children or adolescents.

Areas with higher crime rates showed positive association with the incidence of accidents with children and adolescents as demonstrated in two studies carried out in the UK [5,6]. Graham & Stephens (2008) [5] demonstrated that crime produced the most

convincing and consistent positive association with pedestrian accidents and serious and / or fatal accidents among all exposure factors studied.

Environmental factors

Three of the six selected studies also included the analysis of factors related to environment such as: landscaped areas at the residence, density and flux of vehicles and pedestrians [6], traffic volume [5], local infrastructure of roads and facilities offered to pedestrians (sidewalks, crossings, demarcation of crosswalks and traffic signals) [5,16].

Green, Muir & Mayer (2011) [6] found positive association between socioeconomic factors regardless of environmental factors, but the authors emphasize that in the analytical model developed specifically for Bradford, in one of the two English localities surveyed, the greater availability of landscaped areas at the residence was a protective factor against the involvement of children and adolescents in automotive accidents.

In contrast, in another study carried out in the United Kingdom, such environmental factors served to fit the statistical models developed, but no associations, positive or negative, between accidents involving pedestrian children and traffic volume or local infrastructure of roads were observed [5].

In Lima, Peru, Donroe et al. (2008) [16] found positive association between lack of demarcation of crosswalk, high volume and speed of vehicles and serious accidents involving pedestrians children (those that required some type of medical care). In addition, these associations with environmental factors did not prevent socioeconomic factors from being positively (more children) or negatively correlated (more hours in school and greater number of years of residence in the same house) with automotive accidents involving pedestrian children.

Quality assessment

When assessing the quality of studies included in this review, methodological weaknesses were evident in most articles, which somehow influences the level of scientific evidence produced. The only study that met all items proposed for quality assessment was the case-control study [16], reaching level 1 (Table 3). All other, both cross-sectional and ecological, showed gaps concerning two or more items

recommended for this analysis, and the most frequently observed were: lack of report of methods recommended to reach the study size (sample); no mention of potential sources of bias that could, among others, be related to the selection and classification of participants / groups / areas; statistical methods that did not consider particularities such as the design effect or the need for a multilevel and / or hierarchical analysis; and the way the main results were exposed, which hampered identifying the extent of association and its confidence interval or absence of a multivariate analysis (Table 3).

Discussion

This systematic review brings together and demonstrates from critical analysis knowledge about the association between socioeconomic factors and automotive accidents involving children and adolescents around the world. Income as a socioeconomic factor is correlated with mortality due to automotive accidents when contextually analyzed, but there is no unanimity as to its association when studied at the individual level, varying depending on location and / or population studied. The same is observed in the analysis of educational level and unemployment of parents / guardians, in which in Canada contributes to the increased incidence of injuries, but in the UK, it either was not associated or the association was inverse (employed parents do not assist or supervise their children, consisting a risk factor for involvement in pedestrian accidents). Crime can also be studied as a socioeconomic factor in contextual level and studies that included crime as a factor of interest demonstrated its positive relationship with increased incidence of fatal and non-fatal automotive accidents involving pedestrian children.

Socioeconomic factors have been long considered determinants of health conditions in populations [17] and, more recently, there has been a growing interest in understanding how the characteristics of societies and the different forms of social organizations influence the health and welfare of individuals and groups [18,19]. There is evidence that individual health varies with different social contexts and that many measures of individual level are strongly conditioned by social processes that operate in the group level [20]. According to the model of social determinants of Dahlgren and Whitehead [17], socioeconomic, cultural and environmental conditions of a given society appear as the most distal and general determinants. These conditions enable the

socioeconomic stratification of individuals and population groups, giving them different social positions, which in turn are related to various health conditions.

Regarding accidents in general, there are many studies showing association of socioeconomic factors with falls, drowning, abuse, burns, domestic accidents, automobile accidents, among others that affect children and adolescents [21-29]. However, few studies have shown association of socioeconomic factors with automotive accidents (collision, trampling, among others) affecting children and adolescents [4-7,15,16,30-32].

There is evidence that low socioeconomic level is a predictive factor for various health problems [17, 20-29], including automotive accidents [4-7,15,16,30-32], although not all factors seen in studies included in this review have revealed that significance. For example, the study of Donroe et al. (2008) [16] in Lima (Peru) identified no association between automobile accidents and factors exhaustively reported in literature (poverty, overcrowding and maternal education). The authors suggest as explanatory hypotheses the location where the study was conducted, low-income area, and the relative lack of economic variability of the study population, which may have weakened the poverty effect. Moreover, the dynamics of the Peruvian family tradition must be taken into account, in which many adults live together in the same house and little encouragement to women's education is observed, which would help reducing the effect of overcrowding and lack of maternal education.

From the research perspective on the social determinants of health, few studies have examined the effect of social variables on the occurrence of automotive accidents involving children and adolescents. The level of social deprivation of the area (metropolitan area, urban area and rural area) has been investigated by Graham & Stephens (2008) [5], who studied the score as a whole or divided into six dimensions (income, employment, health, education, housing and service conditions and crime). The authors observed that in the metropolitan area of London, a 10% increase in the score of social deprivation resulted in a 6.3% increase in the incidence of children fatally or seriously victimized by automotive accidents.

In the only ecological study selected, the concern with investigating contextual social determinants was also observed. Darcin & Darcin (2007) [4] identified a strong relationship between quality of life (measured by infant mortality, life expectancy at birth, social exclusion and income distribution inequity) and automotive accidents

affecting pedestrian children and adolescents. These results suggest that fatal traffic accidents victimizing children and adolescents can be considered a problem of socioeconomic backwardness and underdevelopment indicator.

Also in relation to the influence of context, it is important to mention the differential analysis by Green Muir & Mayher (2011) [6]. The authors sought to measure the association between socioeconomic factors and automotive accidents affecting pedestrian children in two ways, first by grouping the records by place of injury occurrence and then by place of residence of the child victim of automotive accident (residency model). While variables related to physical environment and traffic were prominent in models that have investigated risk factors in areas where accidents occurred, the absence of such variables and their replacement by socioeconomic factors (crime, education, unemployment, overcrowding and distance from basic services) in the residency model result in interesting implications for public policies.

These findings, as well as other documented by this review, are critical for the formulation and planning of strategies for the prevention of automobile accidents involving children and adolescents. Policymakers are extremely pressured to perform effective and sustainable programs, but objectives are not always met and one of the reasons suggested, would be the failure to observe contextual determinants [6,30,33].

The assessment of the methodological quality of studies included in a systematic review is an important step because it allows discerning the degree of scientific evidence on the topic. Initially, the design of a study causes implications on the level of evidence generated. The results of experimental studies have greater relevance than those arising from observational studies and, among these, cohort and case-control studies are preferable to cross-sectional and ecological studies [34,35]. However, most articles on automotive accidents are originated from cross-sectional studies based on official records of police institutions, which requires caution because they are possible source of identification (underreporting) and selection and / or classification bias. Some authors have pointed this limitation and suggested the need to study this issue in hospital-based case-control studies [7].

Few studies showed concern with items considered relevant to ensure a consistent methodology by MOOSE [14] and PRISMA [13]. The proper exposure of the main results only occurred in one article [16], which, besides being the only one with case-control design, also met all other criteria used to assess the methodological quality.

Although most articles presented control for confounding factors, only two studies considered potential sources of bias [7,16] and three critically reported the limitations of their research [5,7,16]. Regarding the statistical methods, hierarchical analysis was present in three articles [5,6,16], but none of the five that presented individual and area data used multilevel modeling. This is recommended in epidemiological studies because multilevel models allow modeling context and individual characteristics, thus allowing distinguishing the influence of variables on each level. When the characteristic of the area is built from the aggregation of individual responses, which seems to be the case of two selected studies [5,7], such analysis becomes even more attractive so that differences between areas are not confused by individual features of individuals belonging to each area, the so-called compositional effect [36,37].

In this sense, this systematic review suggests the need for future research seeking to generate more consistent evidence of the association between socioeconomic factors and automotive accidents and analyzing such conditions not only at individual level, but also and mainly in the context where children and adolescents are included.

Conclusions

The socioeconomic conditions of the population or context influence the mortality/morbidity of children and adolescents victims of automobile accidents, regardless of environmental factors related to traffic and road conditions.

However, scientific evidence about the socioeconomic determinants of automobile accidents involving children and adolescents is limited and inconsistent, and is not enough to properly support strategies for the prevention of such accidents.

Further studies should be carried out at different locations and with different populations, based on more rigorous epidemiological designs able to generate more consistent results on this serious public health problem.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

THAL and BMS conceived and designed the study, carried out all the systematic review steps (search and selection of studies, critical analyses, data extraction and quality assessment), conducted the writing of the manuscript. WWNP and ALC participated in the design and planning of the study and helped draft the manuscript. All authors contributed to the writing of the manuscript and critically reviewed the final version. All authors read and approved the final manuscript.

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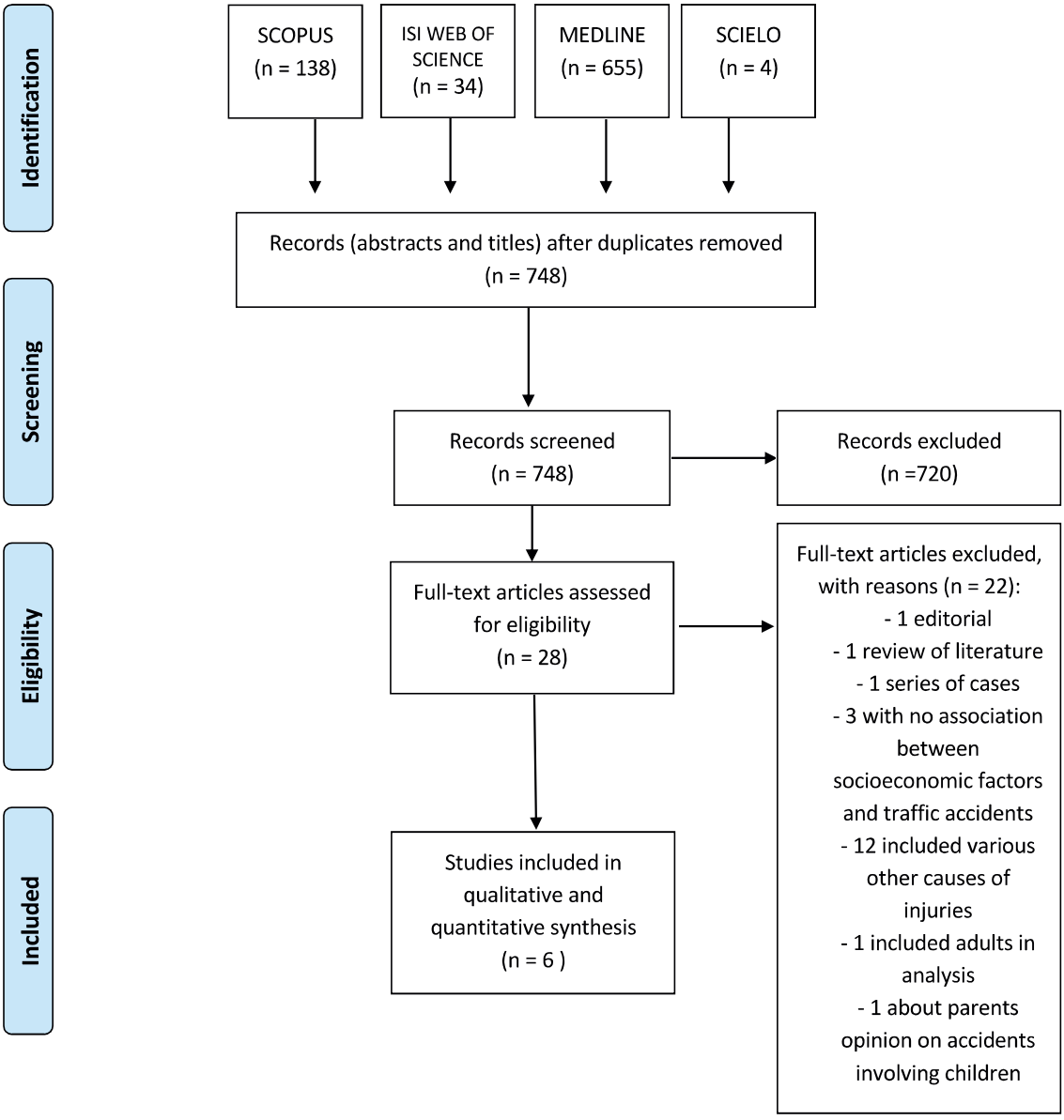

Figure 1. PRISMA flow diagram of the search results from the databases

Table 1. Electronic database used and search strategy

Database	Key words	Filters applied
ISI Web of Science www.	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)	English language
PubMed http://www.ncbi.nlm.nih.gov/pubmed	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles)	Publication dates: 10 years Species: Humans Languages: English and Portuguese Ages: Child: birth-18 years
Scopus www.scopus.com/home.url	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)	Social Sciences English and Portuguese languages
SCIELO www.search.scielo.org	("socioeconomic factors" OR "economic indexes" OR "social conditions" OR "social inequity" OR "social class" OR "social environment" OR "life change events") AND (accidents OR "accidents, traffic" OR "traffic accidents" OR automobiles OR motorcycles) AND (child OR children OR adolescents OR teenagers)	Portuguese language

Table 2 Study characteristics and findings.

Study Number	Author(s) (Date)	Setting	Study design	Population/sample and observation period	Outcome variables	Socioeconomic and environmental factor(s) of interest	Significant relationships between study factors and outcomes
1	Desapriya, E., et al. (2011) [15]	Child Death Review Unit (CDRU), British Columbia (BC), Vancouver, Canada	Cross sectional study (retrospective review of child pedestrian fatalities), comparing socioeconomic factors to BC population data (z and t tests)	33 child pedestrian deaths (0-19 years) from 2003 to 2008	Child pedestrian death	- Income assistance - Parental unemployment - Family structure	- Significant greater number of families of child pedestrian fatalities were receiving income assistance (18.2%) than would be predicted on the average assistance levels in BC (2.5%), indicating a low socioeconomic status - 12,1% of children had at least one parent unemployed - 27.3% of children were in a single parent family
2	Green, J., Muir, H., & Maher, M. (2011) [6]	Police official records of Child Pedestrian casualties (STATS 19) in Leeds and Bradford,	Cross sectional study, measuring the association between socioeconomic and environmental factors and children	2670 children pedestrian casualties (0-17 years) from 2000 to 2005	Children pedestrian casualties, including slight injured and killed or seriously	796 explanatory variables, including: - Population structure of study areas (age, ethnicity, family classification) - Socioeconomic factors (income, employment	Positive association: - Adults with no or low qualification rate (Coeff.0.020; SE 0.002), Crime (Coeff.0.385; SE 0.050), proportion of road (Coeff.0.051; SE 0.010) and number of nodes per area

	United Kingdom (UK)	pedestrian casualties (generalized linear models based on accident location and casualty's home location)	injured	type, housing tenure, journey to work, car ownership levels, land-use information, crime accounting for personal and material victimisation) - Environmental factors (domestic garden areas, junction density, pedestrian and vehicular flow density)	(Coeff.0.003; SE 0.001) in the master model - Crime in both Leeds (Coeff.0.350; SE 0.070) and Bradford (Coeff.0.597; SE 0.088) areas - Education in Leeds (Coeff.0.002; SE 0.000) and Asian ethnicity (Coeff.0.009; SE 0.002) in Bradford Negative association: - U road density (Coeff.-0.070; SE 0.011), travelling to work by taxi (Coeff.-0.171; SE 0.043) and households with 8 or more rooms (Coeff.-0.002; SE 0.001) in the master model - Daytime population working from home (Coeff.-0.005; SE 0.002) in Leeds and Area of domestic garden (Coeff.-0.005; SE 0.001) and Average distance to key services (Coeff.-0.394; SE

							0.152) in Bradford Prevalence of socio-economic variables over physical and traffic environment variables in Residency model (Crime, education, number of female lone parents in part-time employment, unemployment, overcrowding and distance to key services)
3	Graham, D.J., & Stephens, D.A. (2008) [5]	Police official records of Child Pedestrian casualties (STATS 19) in wards of England, United Kingdom (UK)	Cross sectional study, measuring the association between area deprivation and the incidence of child pedestrian casualties (generalized linear models for conurbation, urban and rural subsets)	7917 Child pedestrian casualties (0-16 yeas) from 1998 to 2002 with the following distribution: 1448 in conurbation subset (Great London), 3801 in urban subset and 2668 in rural subset	Children pedestrian casualties (CPCs) and Children killed or seriously injured (CKSIs)	- Area deprivation, including six separate dimensions (income, employment, health, education, housing and services and crime) - Five local factors (absolute number of children-ward population under 16, volume traffic flows, physical nature of the local environment, characteristics of the local road infrastructure	Positive association with CKSIs: - Deprivation (Coeff.0.631; SE 0.037): a 10% increase in deprivation score is associate with a 6.3% increase in the incidence of CKSIs in conurbation subset - Crime score (Coeff.0.205; SE 0.032) and health score (Coeff.0.407; SE 0.030) in urban subset - Income score (Coeff.0.368; SE 0.095) and health score

						and other local specific factors)	(Coeff.0.247; SE 0.070) in rural subset Positive association with CPCs: - Education (Coeff.0.259; SE 0.046)and crime (Coeff.0.152; SE 0.046) dimensions of deprivation index in conurbation subset - Income (Coeff.0.182; SE 0.041), employment (Coeff.0.320; SE 0.050) and crime scores(Coeff.0.184; SE 0.019) , while housing score presented a negative coefficient (Coeff.-0.158; SE 0.023) in urban subset - Income (Coeff.0.452; SE 0.035) and crime scores (Coeff.0.131; SE 0.032) in rural subset
4	Donroe, J. et al. (2008) [16]	Child pedestrian Road Traffic Injuries	Case control study (sub-study of a large community based	100 cases of serious child pedestrian RTIs (0-18 years) from 2000 to 2005	Serious child pedestrian RTIs (when	- Personal risk factors including demographic and socioeconomic factors (poverty,	Positive association: - Greater number of children in the home (OR=1.25;

		(RTI) in San Juan de Miraflores (SMJ), urban district of Lima, Peru	cross sectional study of childhood injuries), measuring the association between personal and environmental factors and child pedestrian RTIs (conditional logistic regression methods)	and 200 controls randomly selected and matched by age and gender	healthcare consultation was necessary), but not fatally injured	overcrowding, education in the head of household and maternal education, years of residence) and school information - Environmental risk factors including pedestrian movement (volume, use of cross walks), vehicle movement (speed, volume and traffic code infractions), pedestrian infrastructure (sidewalks, crosswalks, crossing lights) and vehicle infrastructure (road conditions, traffic lights, speed bumps, lane demarcation, curb side parking)	95%CI: 1.00-1.56) - Greater number of street vendor (OR=1.25; 95%CI: 1.01-1.55) - Absence of lane demarcation (OR=6.59; 95%CI: 1.65-26.26) - High vehicle volume (OR=7.88; 95%CI: 1.97-31.52) and speed (OR=5.35; 95%CI: 1.55-18.54) Negative association: - More hours per day spent in school (OR=0.52; 95%CI: 0.33-0.82) - More years of residence in the same home (OR=0.97; 95%CI: 0.95-0.99)
5	Darcin, M.; & Darcin, E. S. (2007) [4]	WHO and OECD statistics concerning quality of life and child	Ecological study, studying the relationship between children traffic fatality and quality of life in	Children traffic fatality data of 19 countries in 2004 (Austria, Belgium, Czech Republic, Denmark, United	Death proportion of children (Y_1), pedestrian children	- Macroeconomic trends (gross domestic product, national income per capita) - Quality of life (infant	Positive correlation: - Infant mortality highly correlated to death proportion of children (0.50), passenger children (0.80) and traffic

	traffic fatalities from 19 countries	some countries (canonical correlation analysis method)	States, Finland, France, Germany, Hungary, Ireland, Italy, Turkey, Norway, Poland, Portugal, Spain, Sweden, Netherlands and United Kingdom)	(Y_2), bicyclist children (Y_3), passenger children (Y_4) and 0-14 old children (Y_5) in traffic accidents	mortality, life expectancy at birth, social exclusion – youths aged 15-19 years who are neither in education nor in employment – males and females, income inequality distribution – Gini coefficient) - Labour market (employment rates – total and by gender) - Road motor vehicles and road fatalities	fatality of 0-14 years old children (0.93) - Social exclusion among males correlated to death proportion of passenger children (0.67) and traffic fatality of 0-14 years old children (0.60) - Social exclusion among females correlated to death proportion of children (0.50), passenger children (0.84) and traffic fatality of 0-14 years old children (0.85) - Gini coefficient correlated to death proportion of children (0.65), pedestrian children (0.54), passenger children (0.69) and traffic fatality of 0-14 years old children (0.64) - Road fatalities per million vehicles correlated to death proportion of children (0.53), pedestrian children (0.41), passenger children (0.65) and

		traffic fatality of 0-14 years old children (0.66) Negative correlation: - Gross national income per capita correlated to death proportion of children (0.49), pedestrian children (0.58), passenger children (0.51)and traffic fatality of 0-14 years old children (0.42) - Life expectancy to death proportion of children (0.53), pedestrian children (0.41), passenger children (0.61)and traffic fatality of 0-14 years old children (0.71) - Share of persons of working age (15-64 years) in employment to death proportion of children (0.42), pedestrian children (0.34), passenger children (0.56)and traffic fatality of 0-14 years old children (0.46)

6	Hewson, P. (2004) [7]	Police official records of Child Pedestrian casualties (STATS 19) in Devon County, United Kingdom (UK)	Cross sectional study, measuring the association between child deprivation and child pedestrian casualties (generalized linear mixed model)	980 children pedestrian casualties (0-15 years) from 1996 to 2002 aggregated by the ward in which the collision occurred and 372 of these casualties aggregated by the ward in which the casualty was resident	Children pedestrian casualties	Child deprivation (an index based solely in income domain, which measured chidren in households in receipt of a number of state benefits, including income support, income based job-seekers allowance, family credit and disability working allowance)	- Positive association between the deprivation indicator and the casualty rate, whether aggregated by the ward in which the collision occurred (Coeff.0.021; CI: 0.017-0.025) or the ward of residence of the casualty (Coeff.0.021; CI: 0.013-0.029) - Strong evidence for the inclusion of an urbanicity component in the model, which increased the estimate for the deprivation parameter to 0.030 (0.020-0.030) considering the collision location and to 0.032 (0.018-0.046) considering the casualty' home postcode

Table 3 Quality assessment of the studies included in the review.

Quality assesssment criteria	Eligibility criteria		Methods of selection		Exposures clearly defined	Potenctial confounders clearly defined	Diagnostic criteria	Potential source of bias	Study size	Descritptive data	Statistical analysis			Main results	Study' limitations	Level achieved
Studies	Participants	Areas / Groups	Participants	Areas/ Groups							Design effect	Multilevel	Hierarchical			
Desapriya, E., et al. (2011) [15]	YES	NOT APPLIED	YES	NOT APPLIED	YES	ADEQUATE	YES	INADEQUATE	NO	YES	NO	NO	NO	INADEQUATE	NO	3
Green, J., Muir, H., & Maher, M. (2011) [6]	YES	NO	YES	YES	YES	ADEQUATE	NO	INADEQUATE	NO	NO	NO	NO	YES	PARTIALLY ADEQUATE	NO	3
Graham, D.J., & Stephens, D.A. (2008) [5]	YES	NO	YES	YES	YES	ADEQUATE	YES	INADEQUATE	NO	NO	NO	NO	YES	PARTIALLY ADEQUATE	YES	3
Donroe, J. et al. (2008)	YES	YES	YES	YES	YES	ADEQUATE	YES	ADEQUATE	YES	YES	YES	NOT APPLIED	YES	ADEQUATE	YES	1

[16]																
Darcin, M.; & Darcin, E. S. (2007) [4]	NOT APPLIED	NO	NOT APPLIED	NO	YES	ADEQUATE	YES	INADEQAUTE	NO	NOT APPLIED	NO	NO	NO	INADEQUATE	NO	3
Hewson, P. (2004) [7]	YES	NO	YES	YES	NO	INADEQUATE	YES	ADEQUATE	NO	NO	NO	NO	NO	PARTIALLY ADEQUATE	YES	3

Appendix 1 – Items used to assess the quality of the selected studies. It was based on Meta-analysis of Observational Studies in Epidemiology (MOOSE) checklist ("criteria for quality assessment").

1. Eligibility criteria

- Was the eligibility criteria of the participants included in the paper?

Yes/No/Not applied.

- Was the eligibility criteria of the areas/groups included in the paper?

Yes/No/Not applied.

2. Methods of selection

- Was the selection criteria of the participants included in the paper?

Yes/No/Not applied.

- Was the selection criteria of the areas/groups included in the paper?

Yes/No/Not applied.

3. Exposures

- Were the exposures (socioeconomic factors measured at individual level and/or at area level) clearly defined?

Yes/No.

4. Potential confounders

- Were the potential confounders clearly defined?

Adequate, when environmental factors (related to traffic, pedestrian and vehicle movements, and pedestrian and vehicle/roads infrastructure) were taken into account.

Inadequate, environmental factors (related to traffic, pedestrian and vehicle movements, and pedestrian and vehicle/roads infrastructure) were not taken into account.

Unclear, when control for confounder was not adequately explained.

5. Diagnostic criteria

- Was the criterion to define the outcome(s) clearly present?

Yes/No.

6. Bias

- Were potential source of bias (classification, selection, measure, recall) taken into consideration?

Adequate, when authors aimed to prevent many sources of bias, reporting the methods used to avoid them.

Partially adequate, when authors aimed to prevent at least one source of bias, reporting the methods used to avoid it.

Inadequate, when potential source of bias were not taken into account.

7. Study size

- Did the paper explain how the study size was arrived?

Yes/ No.

8. Descriptive data

- Did the authors give characteristics of study participants (number of subjects, gender, settings)?

Yes/ No / Not applied.

9. Statistical analysis

- Did the authors consider the design effect of the study in the analysis?

Yes/No.

- Did the authors conduct multilevel analysis?

Yes/No/Not applied.

- Did the authors conduct hierarchical analysis?

Yes/No.

10. Main results

- Did the authors give unadjusted estimates and confounders adjusted estimates and their precision (95% confidence interval)?

Adequate, when estimates of association PR (prevalence ratio) or OR (odds ratio) were provided or could be calculated, and multivariate analysis was conducted.

Partially adequate, when estimates of association PR (prevalence ratio) or OR (odds ratio) were not provided and could not be calculated, but multivariate analysis was conducted.

Inadequate, when only bivariate analysis was performed, but no multivariate analysis was conducted.

11. Study's limitations

- Did the authors report the limitations of the studies, explaining how the results should be undestand?

Yes/No.

Summary of quality assessment - The studies included in the review were classified as:

Level 1: when the study reported all the criteria presented above.

Level 2: when the study evaluated outcomes, exposures, potential confounders, bias, and main results.

Level 3: when the study was not classified in level 1 or 2.

ARTIGO II

Head and maxillofacial injuries in children and adolescents victims of automotive accidents : a brazilian cross-seccional study

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Abstract

Background. Victims of motor vehicle accidents may suffer multiple lesions including maxillofacial injuries. The aim of this study was to evaluate the prevalence and factors associated with head, face and maxillofacial injuries in children and adolescents victims of automobile accidents.

Methods. A cross-seccional study was carried out with analysis of forensic medical reports from the Legal Medicine Institute of Campina Grande, Brazil, between January 2008 and December 2011. Descriptive and inferential statistical analysis was conducted using the chi-square test ($\alpha = 0.05$).

Results. From 1613 medical reports analyzed, 232 (14.4%) reports referring to children and adolescents aged 0-19 years of both gender victims of automobile accidents composed the sample. Victims were mostly adolescents aged from 15 to 19 years (64.2%), males (73.7%) and motorcyclists (51.3%). More than half of victims had single lesions (54.3%) located in head (20.7%) and face (21.6%). Head injuries occurred more frequently in children aged 0-4 years (53.8%, PR = 5.065, 95% CI = 1.617-5.870) and pedestrians (30.4%, PR = 2.039, 95% CI = 1.024-4.061), while face and maxillofacial injuries occurred in higher proportion among females (31.1%, PR = 0.489, 95% CI = 0.251-0.954).

Conclusions. Our findings suggest that accidents involving motorcyclists are the most prevalent, affecting male adolescents aged from 15 to 19 years, resulting in high frequency of injuries in the region of head and face.

Keywords: accidents, traffic; wounds and injuries; facial injuries.

Background

Unintentional injuries are the leading causes of morbidity and mortality in children and adolescents [1]. Individuals in this stage of life are looking for new references and experiences, resulting in risky behavior and exposure to certain injuries [2].

Within the context of unintentional injuries, the head region constitutes the most affected area in pediatric patients [3,4,5], and can be associated with severe, temporary or permanent consequences, being responsible for almost 90% of all pediatric deaths [6]. Therefore, unintentional injuries are responsible for physical, emotional, social and economic damage, including medical care expenses [3,7], thus becoming a public health problem.

The major contributor to unintentional maxillofacial and head injuries in the pediatric population are automobile accidents [8,9]. The prevalence of these lesions ranges from 34.2% [3] to 57.8% [10]. In Brazil, a previous study showed a frequency of 50% of head injuries and 56.6% of intraoral injuries among adolescent victims of automobile accidents [8]. Victims of motor vehicle accidents may suffer multiple lesions including maxillofacial injuries [11].

Social, cultural and environmental factors have been associated with the pattern of head and maxillofacial injuries [9,12]. The literature covers a wide variety of topics including the profile of hospital admissions [3,10], clinical management of head injuries [13] and the economic costs involved in the treatment of victims [14].

However, few studies have focused on the factors associated with injuries in the head region, especially maxillofacial injuries in the pediatric population [5,8,9]. Studies have identified not only the factors involved in its occurrence, but also the social environment in which they occur, resulting in greater visibility [2]. Nevertheless, studies on this subject help to clarify the circumstances and support the development of clinical audit, services management and public policies for health prevention and promotion [9].

Given the above, this study aimed to determine the prevalence and factors associated with head, face and maxillofacial injuries in Brazilian children and adolescents victims of automotive accidents.

Methods

This study followed ethical guidelines recommended by the Brazilian legislation and was approved by the Human Research Ethics Committee of the State University of Paraiba (Protocol number 04443.0133.000-11).

Design and Sample

A cross-seccional study design was undertaken by the analysis of expert medical reports derived from medical forensic exams performed at the Legal Medicine Institute of Campina Grande, PB, Brazil, between January 2008 and December 2011. The city of Campina Grande presented a considerable cultural, social and economic disparities, average monthly income of $ 110 per capita and Human Development Index of 0.72.

From a universe of 1613 reports issued is this time span, the study sample consisted of 232 reports (14.4%) referring to children and adolescents of both genders, aged 0 to 19 years and victims of motor vehicle accidents.

Data Collection

Data referring to the victims' gender, age, day of week of accident, quality of victim, number of existing injuries, presence of fractures, anatomic location of injuries to the head, face, maxillofacial, oral cavity and maxillofacial fractures (if present) were gathered from the forensic medical reports and transferred to specific registration forms, which were kept in folders classified according to the event.

A road traffic injury was defined as any injury (regardless of severity) that occurred while walking, bicycling, or riding in a vehicle due to a crash involving one or more vehicles and originating or terminating on a roadway [15].

Statistical Analysis

Data analysis involved descriptive statistics (frequency distribution) and analytic statistics. Bivariate analyses were conducted to test the association between the occurrence of head, face and maxillofacial injuries and sex and age of the victims. This process was performed using the Pearson's chi-squared test.. The prevalence ratios and its 95% confidence interval were also calculated. The significance level established for all statistical analyses was 5% ($P \leq 0.05$) and they were conducted using the SPSS 18.0 (Statistical Package for the Social Sciences for Windows®, SPSS Inc., Chicago, IL, USA).

Results

Victims of automotive accidents were mostly adolescents aged 15-19 years (64.2%), mean of 14.67 (SD = 4.69) years, male (73.7%) and motorcyclists (51.3%) (Table 1). Male to female ratio was 2.8:1.

Figure 1 shows the distribution of automotive accidents according to the day of week, indicating that more than one third of cases occurred over the weekend (36.2%), with predominance on Sunday (21.1%). The lowest prevalence was recorded for Thursday (9.5%).

Regarding the number of lesions, single lesions were the most frequent (54.3%). However, 65.9% had fractures in various regions of the body, and maxillofacial fractures were identified in only 2.6% of victims. To analyze the anatomical location, it was found that maxillofacial and head injuries occurred to 21.6% and 20.7%, respectively (Table 2). Only 5.6 % of victims exhibited intraoral injuries.

Table 3 shows association between head, face and maxillofacial injuries and demographic and automotive accident characteristics. Association between presence of head injuries and age of the victim ($P<0.05$) and between presence of head injuries and type of automotive accident ($P<0.05$) was observed, with greater frequency among children aged 0-4 years (53.8%, PR = 5.065, 95% CI = 1.617-5.870) and pedestrians (30.4%, PR = 2.039, 95% CI = 1.024-4.061). Regarding face injuries, only association with sex was observed (PR = 0.489, 95% CI = 0.251-0.954).

When analyzing accidents involving motorcyclists separately, there was an association between this type of accident and the occurrence of injuries in head ($P<0.001$, PR = 0.310, 95% CI = 0.156-0.616) and lower limbs ($P<0.05$, PR = 1.765, 95% CI = 1.029-3.029). No association between this variable and the presence of face and upper limb injuries were found ($P>0.05$). However, there was an association between motorcycle accidents and the presence of injuries ($P<0.05$, PR = 1.789, 95% CI = 1.033-3.100).

Discussion

Unintentional head and maxillofacial injuries largely contribute to morbidity and mortality in pediatric and young adult populations [1,5,8,14]. Social, cultural and environmental factors have been associated with the pattern of head and maxillofacial injuries, especially those caused by automobile accidents [9,12].

The present study, which focused on road traffic accidents, is probably one of the few studies developed in Brazil with the aim of investigating the characteristics of victims especially those involving the head and face regions. These data are of particular importance to the dentists and pediatricians.

The high morbity and mortality rates related to transport accidents in Brazil have been associated with the fact that private cars are usually preferred over other means of transportation and the roads are the main via of circulation even not offering adequate conditions in terms of conservation and safety [16].

The analysis of gender and age distribution showed that the highest prevalence of road traffic accidents involves male victims aged 15 and 19 years, which is consistent with findings of previous studies [2,3,13,17,18]. This predominance illustrates the effect of sociocultural behavior, crystallized in the notion of sex and age, in which inexperienced thrill-seeker young males take more risks in driving vehicles, experiencing risky sensations, in addition to the abuse of alcohol or drugs [2,3,17].

Regarding the type of automobile accident, those involving motorcycles were the most prevalent, as reported by other authors [2,5,8,19]. The transportation of children and adolescents on motorcycles is a common practice in small- and medium-sized Brazilian cities, such as Campina Grande, where the present study was conducted, because this is the main means of transportation among the low-socioeconomic population [5]. Other factors such as difficulty of visualization of motorcycles by other drivers, occurrence of inappropriate behavior in traffic and disregard of traffic laws, besides the fact that few cities dispose of exclusive lanes for motorcyclists stand out [19].

Also with respect to accidents involving motorcyclists, it is important to note that one-fifth of victims were female, which reinforces the hypothesis that women are more often using this means of transportation to perform daily activities [20].

Accidents involving pedestrian are the second major cause of road traffic accidents. Pedestrian, with its relatively small mass compared to that of a motor vehicle, offers little resistance, absorbing the impact energy, which increases the morbidity and mortality rates for this group of victims [21].

As for the day of week, regardless of type, most accidents occurred on Fridays and Sundays, with the weekend accounting for more than one third of traffic accidents. The higher occurrence on weekends may be related to the risky behavior in traffic such as driving over the speed limit, disrespect of traffic rules and driving under alcohol effect.

Although more than half the victims have a single lesion, two thirds of children and adolescents had injuries in different body regions. There was an association between being victim of motorcycle accident and presenting head and lower limb injuries. Motorcycle drivers do not rely on an outer structure to protect them, absorbing most of the impact energy and therefore are commonly thrown against the floor. These victims suffer, besides the impact from the accident itself, also the impact against the ground, usually followed by sliding [22].

The prevalence of head, face and maxillofacial injuries was similar to that reported by other studies [2,9,18]. Speed, position of victim, use of safety devices, and surface impact geometry are mostly responsible for the degree of impact and injuries sustained in road traffic accidents [23].

Some limitations of this study should be highlighted. It is possible that a small portion never been to the Institute of Forensic Medicine to conduct the *corpus delicti* forensic examination as recommended by Brazilian legislation. Another limitation includes incomplete or missing data within the forensic medical record.

Considering the physical, psychological, and emotional distresses that accompany these injuries, it is important for our government to legislate and enforce traffic rules, strengthen road safety measures and also implement poverty alleviation programs [23].

Conclusions

Accidents involving motorcyclists are the most prevalent, affecting male adolescents aged from 15 to 19 years, resulting in high frequency of head and face injuries.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

TBSO, TSBO, AFCX and RFM participated in the design of the study, carried out the data collection, conducted statistical analyses and helped draft the manuscript. ALC and WWNP conceived and designed the study, coordinated and carried out statistical analyses and drafted the manuscript. THAL and AMRC participated in the design of the study and carried out the

data collection. All authors contributed to the writing of the manuscript and critically reviewed the final version. All authors read and approved the final manuscript.

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Figure 1. Distribution of accidents according to the day of week.

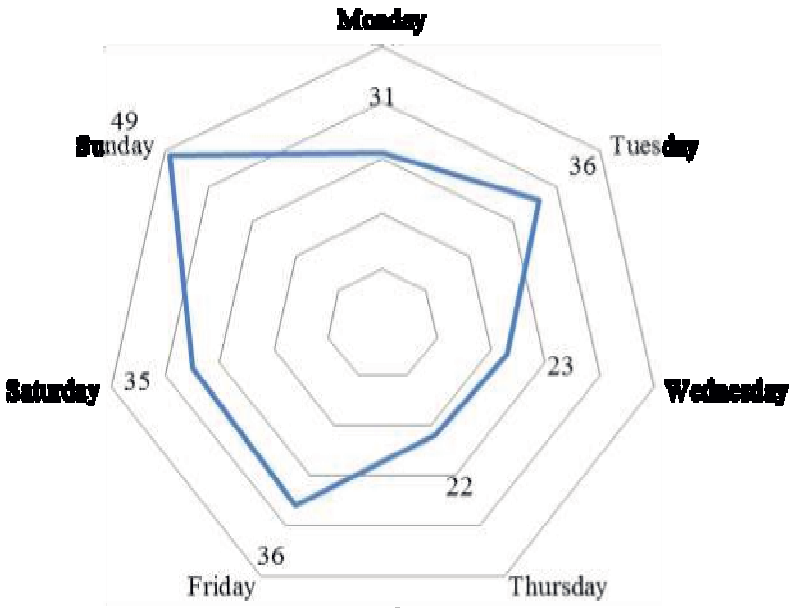

Table 1. Sample distribution according to age, type of accident and gender.

Variable	Gender				Ratio	Total	
	Male		Female				
	n	%	n	%		n	%
Age							
0-4 years	8	61.5	5	38.5	1.6:1	13	5.6
5-9 years	16	66.6	8	33.4	2:1	24	10.4
10-14 years	35	76.1	11	23.9	3.2:1	46	19.8
15-19 years	112	75.2	37	24.8	3:1	149	64.2
Total	171	73.7	61	26.3	2.8:1	232	100.0
Type of accident							
Pedestrian	39	69.6	17	30.4	2.3:1	56	24.1
Cyclist	5	100.0	0	0.0	-	5	2.2
Motorcycle	95	79.8	24	20.2	3.9:1	119	51.3
Occupant vehicle	30	60.0	20	40.0	1.5:1	50	21.6
Others	2	100.0	0	0.0	-	2	0.9

Table 2. Distribution of victims according to the number of lesions, existence of fracture, maxillofacial injury and anatomical region involved.

	Frequency	
Variable	N	%
Number of lesions		
Single	126	54.3
Multiple	106	45.7
Fracture		
Yes	153	65.9
No	79	34.1
Maxillofacial injury		
Yes	6	2.6
No	226	97.4
Anatomical region		
Head	48	20.7
Face	50	21.6
Maxillofacial	50	21.6
Intraoral	13	5.6

Table 3. Association between gender, age, type of accident and occurrence on weekends and the presence of head, face and maxillofacial injuries.

	Head injury				Face injury				Maxillofacial injury			
	Yes	No	p-value	PR (IC95%)	Yes	No	p-value	PR (IC95%)	Yes	No	p-value	PR (IC95%)
Variable	n (%)	n (%)			n (%)	n (%)			n (%)	n (%)		
Gender												
Male	31 (18.1)	140 (81.9)			31 (18.1)	140 (81.9)			31 (18.1)	140 (81.9)		
Female	17 (27.9)	44 (72.1)	> 0.05	0.573 (0.290 -1.133)	19 (31.1)	42 (68,9)	< 0,05	0.489 (0.251-0.954)	19 (31.1)	42 (68.9)	< 0.05	0.489 (0.251-0.954)
Age												
0-4 years	7 (53.8)	6 (46.2)		5.065 (1.617-5.870)	5 (38.5)	8 (61.5)		2.417 (0.754-7.743)	5 (38.5)	8 (61.5)		2.417 (0.754-7.743)
5-9 years	4 (16.7)	20 (83.3)	< 0.05	1.00	3 (12.5)	21 (87.5)	> 0.05	1.00	3 (12.5)	21 (87.5)	> 0.05	1.00
10-14 years	10 (21.7)	36 (78.3)		1.082 (0.493-2.374)	10 (21.7)	36 (78.3)		1.014 (0.463-2.219)	10 (21.7)	36 (78.3)		1.014 (0.463-2.219)
15-19 years	27 (18.1)	122 (83.9)		0.653 (0.342-1.248)	32 (31.5)	117 (78.5)		0.988 (0.514-1.896)	32 (31.5)	117 (78.5)		0.988 (0.514-1.896)
Type of Accident												
Pedestrian	17 (30.4)	39 (69.6)		2.039 (1.024-4.061)	12 (21.4)	44 (78.6)		0.990 (0.476-2.060)	12 (21.4)	44 (78.6)		0.990 (0.476-2.060)
Cyclist	2 (40..0)	3 (60.0.)		2.623 (0.426-16.161)	1 (20.0)	4 (80.0)		0.908 (0.999-8.312)	1 (20.0)	4 (80.0)	> 0.05	0.908 (0.999-8.312)
Motorcycle	14 (11.8)	105 (88.2)	< 0.01	1.00	22 (18.5)	97 (81.5)	> 0.05	1.00	22 (18.5)	97 (81.5)		1.00
Occupant vehicle	15 (30.0)	35 (70.0.)		1.935 (0.949-3.947)	15 (30.0)	35 (70.0)		1.800 (0.886-3.655)	15 (30.0)	35 (70.0)		1.800 (0.886-3.655)
Others	0 (0.0)	2 (100.0)		1.264 (1.183-1.350)	0 (0.0)	2 (100.0)		1.278 (1.194-1.368)	0 (0.0)	2 (100.0)		1.278 (1.194-1.368)
Weekend												
Yes	15 (17.9)	69 (82.1)	> 0.05	0.758 (0.384 -1.498)	23 (27.4)	61 (72.6)	> 0.5	1.690 (0.895-3.191)	23 (27.4)	61 (72.6)	> 0.05	1.690 (0.895-3.191)
No	33 (22.3)	115 (77.7)			27 (18.2)	121 (81.8)			27 (18.2)	121 (81.8)		

5 CONSIDERAÇÕES FINAIS

No presente estudo verificou-se a existência de evidências da associação positiva entre os baixos níveis socioeconômicos de uma população e um maior acometimento dos acidentes automotivos, principalmente envolvendo crianças e adolescentes. Esse fato acarreta uma maior morbimortalidade nessa faixa etária, fazendo com que, em alguns casos, ocorra um predomínio dessa causa externa em relação às doenças infecciosas, as quais normalmente são mais comuns em se tratando de indivíduos na infância e na adolescência.

As crianças e adolescentes são as maiores vítimas dos acidentes automotivos, os quais ocasionam, principalmente, lesões na cabeça e face. Nesse contexto, os acidentes envolvendo motocicletas são os mais comuns, sugerindo que localidades com nível de renda mais baixo as utilizam como principal meio de transporte. Tal situação é observada em quase todo interior do nordeste brasileiro.

Dessa forma, faz-se necessário o investimento em práticas educativas que considerem as especificidades regionais e locais e que visem o controle dos fatores de risco envolvidos nos acidentes automotivos acometendo crianças e adolescentes como também de uma maior fiscalização do uso dos meios de transporte.

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APÊNDICE I

Quality Assessment Criteria

Items used to assess the quality of the selected studies. It was based on Meta-analysis of Observational Studies in Epidemiology (MOOSE) checklist ("criteria for quality assessment").

1. Eligibility criteria

- Was the eligibility criteria of the participants included in the paper?

Yes/No/Not applied.

- Was the eligibility criteria of the areas/groups included in the paper?

Yes/No/Not applied.

2. Methods of selection

- Was the selection criteria of the participants included in the paper?

Yes/No/Not applied.

- Was the selection criteria of the areas/groups included in the paper?

Yes/No/Not applied.

3. Exposures

- Were the exposures (socioeconomic factors measured at individual level and/or at area level) clearly defined?

Yes/No.

4. Potential confounders

- Were the potential confounders clearly defined?

Adequate, when environmental factors (related to traffic, pedestrian and vehicle movements, and pedestrian and vehicle/roads infrastructure) were taken into account.

Inadequate, environmental factors (related to traffic, pedestrian and vehicle movements, and pedestrian and vehicle/roads infrastructure) were not taken into account.

Unclear, when control for confounder was not adequately explained.

5. Diagnostic criteria

- Was the criterion to define the outcome(s) clearly present?

Yes/No.

6. Bias

- Were potential source of bias (classification, selection, measure, recall) taken into consideration?

Adequate, when authors aimed to prevent many sources of bias, reporting the methods used to avoid them.

Partially adequate, when authors aimed to prevent at least one source of bias, reporting the methods used to avoid it.

Inadequate, when potential source of bias were not taken into account.

7. Study size

- Did the paper explain how the study size was arrived?

Yes/ No.

8. Descriptive data

- Did the authors give characteristics of study participants (number of subjects, gender, settings)?

Yes/ No / Not applied.

9. Statistical analysis

- Did the authors consider the design effect of the study in the analysis?

Yes/No.

- Did the authors conduct multilevel analysis?

Yes/No/Not applied.

- Did the authors conduct hierarchical analysis?

Yes/No.

10. Main results

- Did the authors give unadjusted estimates and confounders adjusted estimates and their precision (95% confidence interval)?

Adequate, when estimates of association PR (prevalence ratio) or OR (odds ratio) were provided or could be calculated, and multivariate analysis was conducted.

Partially adequate, when estimates of association PR (prevalence ratio) or OR (odds ratio) were not provided and could not be calculated, but multivariate analysis was conducted.

Inadequate, when only bivariate analysis was performed, but no multivariate analysis was conducted.

11. Study's limitations

- Did the authors report the limitations of the studies, explaining how the results should be undestand?

Yes/No.

Summary of quality assessment - The studies included in the review were classified as:

Level 1: when the study reported all the criteria presented above.

Level 2: when the study evaluated outcomes, exposures, potential confounders, bias, and main results.

Level 3: when the study was not classified in level 1 or 2.

APÊNDICE II

Formulário de Coleta dos Dados

INSTRUMENTO PARA COLETA DE DADOS	
Nº do laudo:	
1. Ano: ☐ 1. 2008 ☐ 3. 2010 ☐ 2. 2009 ☐ 4. 2011	**2. Data:**_____/_____/_____
3. Mês: ☐ 1. Janeiro ☐ 7. Julho ☐ 2. Fevereiro ☐ 8. Agosto ☐ 3. Março ☐ 9. Setembro ☐ 4. Abril ☐ 10. Outubro ☐ 5. Maio ☐ 11. Novembro ☐ 6. Junho ☐ 12. Dezembro	**4. Horário:** ☐ 1. Madrugada ☐ 2. Manhã ☐ 3. Tarde ☐ 4. Noite ☐ 999. Não informado
5. Dia da semana: ☐ 1. Segunda-feira ☐ 2. Terça-feira ☐ 3. Quarta-feira ☐ 4. Quinta-feira ☐ 5. Sexta-feira ☐ 6. Sábado ☐ 7. Domingo ☐ 999. Não informado	
Caracterização das Vítimas	
6. Idade: ( ) em anos.	
7. Faixa Etária: ☐ 1. 0-4 anos ☐ 2. 5-9 anos ☐ 3. 10-14 anos ☐ 4. 15-19 anos	**8. Sexo:** ☐ 1. Masculino ☐ 2. Feminino
Caracterização do Evento	
9. Causa: ☐ 1. Acidentes de transporte (V01-V99) ☐ 2. Queda (W00-W19) ☐ 3. Exposição a Forças Mecânicas Inanimadas (W20-W49) ☐ 4. Exposição a Forças Mecânicas Animadas (W50-W64)	

☐ 5. Afogamento e submersão acidentais (W65-W74)

☐ 6. Outros riscos acidentais à respiração (W75-W84)

☐ 7. Exposição a corrente elétrica, a radiação e a temperatura e pressão extremas do ar ambiental (W85-W99)

☐ 8. Queimaduras (X00-X19)

☐ 9. Contato com animais e plantas venenosas (X20-X29)

☐ 10. Exposição às forças da natureza (X30-X39)

☐ 11. Envenenamento (X40-X49)

☐ 12. Exposição acidental a outros fatores ou não identificada

☐ 13. Lesões autoprovocadas voluntariamente (X60-X84)

☐ 14. Agressões (X85-Y09)

☐ 15. Eventos com Intenção Indeterminada (Y10-Y34)

☐ 16. Intervenções legais e operações de guerra (Y35-Y36)

☐ 17. Complicações de assistência médica e cirúrgica (Y40-Y84)

10. Tipos de acidentes de trânsito:

☐ 1. Pedestre

☐ 2. Ciclista

☐ 3. Motociclista

☐ 4. Triciclo

☐ 5. Ocupante de veículo

☐ 6. Outros acidentes de transporte

☐ 888. Não se aplica

☐ 999. Não informado

11. Local de Ocorrência:

☐ 1. Residência

☐ 2. Habitação coletiva

☐ 3. Escola ou outra instituição

☐ 4. Área de esportes e lazer

☐ 5. Via Pública

☐ 6. Local de trabalho

☐ 999. Não informado

12. Autor da Agressão:

☐ 1. Pais

☐ 2. Pai

☐ 3. Mãe

☐ 4. Irmão (ã)

☐ 5. Madrasta

☐ 6. Padrasto

☐ 7. Avós

☐ 8.Outros familiares _____

☐ 9. Vizinhos

☐ 10. Professor(a)

☐ 11. Outros_____

☐ 999. Não informado

13. Arma utilizada:

☐ 1. Arma de fogo

☐ 2. Arma branca

☐ 888. Não se aplica

☐999. Não informado

<table>
<tr><th colspan="2">Caracterização das lesões</th></tr>
<tr><td colspan="2">14. Quantificação das lesões: ☐ 1. Única ☐ 2. Múltipla</td></tr>
<tr><td>15. Local do corpo atingido:
☐ 1. Cabeça
☐ 2. Face
☐ 3. Pescoço
☐ 4. Tórax
☐ 5. Abdômen
☐ 6. Dorso
☐ 7. Glúteos
☐ 8. Membros superiores
☐ 9. Membros inferiores
☐ 10. Quadril
☐ 11. Genitália</td><td>16. Tipo de lesão:
☐ 1. Equimose
☐ 2. Escoriação
☐ 3. Edema
☐ 4. Hematoma
☐ 5. Hiperemia
☐ 6. Ferimento
☐ 7. Outra</td></tr>
<tr><td rowspan="2">17. Tipos de ferimentos:
☐ 1. Contuso
☐ 2. Perfurante
☐ 3. Cortante
☐ 4. Inciso
☐ 5. Lacerado
☐ 6. Perfuro-contuso
☐ 7. Pérfuro-cortante
☐ 8. Corto-contuso
☐ 9. Esmagamento
☐ 10. Puntiforme
☐ 11. Outro</td><td>18. Presença de fratura:
☐ 1. Sim
☐ 2. Não</td></tr>
<tr><td>19. Lesões maxilofaciais:
☐ 1. Sim
☐ 2. Não</td></tr>
<tr><td rowspan="2">20. Tipos de lesões maxilofaciais:
☐ 1. Fratura frontal
☐ 2. Fratura orbitária
☐ 3. Fratura nasal
☐ 4. Fratura zigomática
☐ 5. Fratura maxilar
☐ 6. Fratura mandibular
☐ 7. Contusão mentual
☐ 8. Lesões oculares
☐ 9. Contusão nasal
☐ 10. Outras lesões em tecido mole.</td><td>21. Presença de lesão na cavidade bucal:
☐ 1. Sim
☐ 2. Não</td></tr>
<tr><td>22. Tipo de envolvimento tecidual na cavidade bucal:
☐ 1. Tecido mole
☐ 2. Tecido Duro
☐ 3. Tecido mole e duro
☐ 888. Não se aplica</td></tr>
<tr><td colspan="2">23. Ocorrência do óbito: ☐ 1. Sim ☐ 2. Não</td></tr>
</table>

ANEXO I

Parecer do Comitê de Ética em Pesquisa (CEP) com Seres Humanos

UNIVERSIDADE ESTADUAL DA PARAIBA
COMITÊ DE ÉTICA EM PESQUISA ENVOLVENDO SERES HUMANOS

FORMULÁRIO DE PARECER DO CEP – UEPB

PROJETO: CAAE N: 0443.0.133.000-11

PARECER

x **APROVADO**

NÃO APROVADO

PENDENTE

TITULO: Morbimortalidade Por Causas Externas Em Crianças E Adolescentes E Fatores Associados

PESQUISADOR RESPONSÁVEL: Alessandro Leite Cavalcanti

PARECER: O projeto aborda temática relevante e, considerando a objetividade e clareza do pesquisador, bem como a observância aos aspectos éticos, somos de parecer favorável ao desenvolvimento da pesquisa.

Campina Grande, 05/09/2011 **Relator: 07**

UNIVERSIDADE ESTADUAL DA PARAÍBA
PRÓ-REITORIA DE PÓS-GRADUAÇÃO E PESQUISA
COMITÊ DE ÉTICA EM PESQUISA

Profª Drª. Dorsilária Pedrosa de Araújo
Coordenadora do Comitê de Ética em Pesquisa

ANEXO II

Comprovante de Submissão do Artigo I

ANEXO III

Comprovante de Submissão do Artigo II

-------- Mensagem original --------

Assunto:632720: Acknowledging Receipt

Data:Mon, 30 Jun 2014 18:03:01 +0000

De:The Scientific World Journal <dalia.osman@hindawi.com>

Para:thiago@thiagolino.med.br

Dear Dr. Thiago Henrique de Araujo Lino,

I am writing to let you know that your Research Article titled "Head and Maxillofacial Injuries in Children and Adolescents Victims of Automotive Accidents," by Alessandro Leite Cavalcanti, Thiago Henrique de Araujo Lino, Thaliny Oliveira, Thaisy Sarmento Batista de Oliveira, Andreia Medeiros Rodrigues Cardoso, Rodrigo Feliciano de Macedo, Wilton Wilney Nascimento Padilha and Alidianne Xavier hasbeen submitted to The Scientific World Journal by Alessandro Leite Cavalcanti and it has been assigned the manuscript number 632720.

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Best regards,

Dalia Osman

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