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Nonfatal injury incidence and risk factors among middle school students from four Polynesian countries: The Cook Islands, Niue, Samoa, and Tonga

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ABSTRACT

Introduction: The burden of injuries in Pacific Island countries is understudied despite the known challenges associated with many residents having limited access to advanced medical and surgical care when they sustain a serious injury. This paper examines nonfatal injuries among early adolescent schoolchildren (those primarily ages 13–15 years) from four Polynesian countries.
Methods: Self-reported data from the 5507 middle school students who were randomly sampled for participation in the nationwide Global School-based Student Health Surveys (GSHS) in the Cook Islands (in the year 2009), Niue (2010), Samoa (2011), and Tonga (2010) were analysed with various statistical methods including regression models. Injuries were defined by the GSHS questionnaire as serious if they resulted in a full day of missed school or other usual activities or required medical treatment.
Results: The proportion of students reporting a serious injury in the past year was 43.1% in the Cook Islands, 40.8% in Niue, 73.8% in Samoa, and 49.1% in Tonga. In the Cook Islands and Samoa, boys reported more injuries than girls ($p < 0.01$). The most common types of serious injuries reported were cuts and other skin trauma; broken bones and dislocated joints; and concussions, other head injuries, or difficulty breathing. The most common causes of serious injuries reported were falls; motor vehicle accidents; and attacks, fights, or abuse. For both boys and girls, being bullied in the past month, being physically attacked or in a physical fight in the past year, using alcohol and tobacco, skipping school, and having anxiety or loneliness were associated with a higher likelihood of injuries.
Conclusions: School-based health education programs targeting prevention of intentional and unintentional injuries may benefit from emphasising Polynesian values and promoting personal mental and physical health, healthy behaviours, and healthy family and community relationships.

Introduction

Unintentional injuries from road traffic accidents, falls, and other causes are responsible for more than 10% of the morbidity, disability, and mortality among adolescents globally [1–4]. Self-inflicted injuries are also concerns among adolescents [5]. However, the burden of injury in adolescents has been understudied because this age group has a lower overall mortality rate than young children and older adults [2], and because injuries have often, but incorrectly, been considered to be unpredictable and therefore unpreventable events [6]. While a variety of modifiable behavioural and environmental risk factors, such as alcohol use and unsafe roads, have been identified, few studies have systematically examined the risk factors for youth injuries [7].

This paper examines nonfatal injury incidence rates, types, causes, and risk factors among adolescent schoolchildren from the Polynesian region who participated in the Global School-based Student Health Survey (GSHS). The GSHS is a youth risk behaviour survey conducted by ministries of health and/or education of participating countries in collaboration with the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention (CDC). The GSHS is similar to the Health Behaviour in School-Aged Children (HBSC) survey: both the GSHS and HBSC are long-running multi-country youth risk behaviour surveys aiming to understand health attitudes and behaviours during the years of middle school (which may alternatively be called intermediate school, junior secondary school, or other names using local terminology). The HBSC has been used for cross-national

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comparison of high-income countries for more than 30 years; the GSHS is primarily implemented in low- and middle-income countries (LMICs). The GSHS aims to quantify the health and risk behaviours of early adolescents – defined by the GSHS protocol as those who are ages 13 to 15 years old or are enrolled in school classes in which the majority of students are in that age range – by surveying a nationally-representative sample of school-going youth. The use of a standard protocol and question bank – one with modules designed to capture the core indicators associated with the emerging field of prevention science [8] – ensure the comparability of results from different countries. GSHS results can be combined with additional data about the social and economic determinants of health, community risk and protective factors, and health outcomes in order to provide an evidentiary foundation for the development of adolescent health policies and interventions [9].

The Pacific Islands are generally considered to include three regions (Melanesia, Micronesia, and Polynesia) that have distinct cultures but the shared experience of living on geographically isolated islands. Polynesia consists of more than one thousand islands scattered across the South Pacific Ocean east of Australia and south of the Equator. The region includes several independent nations and self-governing states (the Cook Islands, New Zealand, Niue, Samoa, Tonga, and Tuvalu) along with several territories, dependencies, and states or collectivities of other nations (such as American Samoa, Easter Island, French Polynesia, Hawaii, Pitcairn Islands, Tokelau, and Wallis and Futuna). To date, four countries from the Polynesian region have participated in the GSHS and made their GSHS datasets available to the public: the Cook Islands, Niue, Samoa, and Tonga. (GSHS data were collected in Tuvalu in 2011 and Tokelau in 2014, but these datasets have not yet been released for general use.) Samoa and Tonga are both independent nations; the Cook Islands and Niue are self-governing nations in free association with New Zealand. Table 1 provides an overview of the demographic and socioeconomic characteristics of each of the four countries featured in this paper.

Few studies of injury epidemiology have been conducted in Polynesia or, more broadly, among small island nations. Drowning (and near-drowning) is known to be a leading cause of unintentional injury for island nations in the Western Pacific region [1], and the incidence rate of fatal and nonfatal road traffic injuries has been shown to be increasing as more vehicles are on the roads of Pacific Island countries [4,10]. However, few surveys have investigated the incidence of diverse nonfatal injuries in the Pacific, and adolescent injuries have been the focus of few previous analyses.

Residents of island nations may face a particular burden from injuries because of limited access to advanced medical and surgical care [11]. Urbanisation is occurring in parts of Polynesia, but the population is mostly rural, and rural areas may have extremely limited access to professional medical care (in part due to "brain drain," the outmigration of healthcare workers [12]). Samoa, in particular, has a severe lack of doctors, nurses, and midwives [12]. Limited access to health services may contribute to the health-related quality of life being lower among adolescents in Samoa and other Pacific Islands than in other countries [13]. In this resource-challenged environment, it is important to understand the population-specific threats to health and to identify low-cost, effective interventions. Although most injures occur unintentionally, the majority of injuries can be prevented.

The specific aims of this analysis were: (1) to determine the proportion of girls and boys attending middle schools in the Cook Islands, Niue, Samoa, and Tonga who sustained a serious but nonfatal injury in the past year, (2) to identify the most common types and causes of these injuries, and (3) to identify risk factors for injuries among boys and girls that might point to effective interventions for reducing injury incidence.

Methods

Sampling and data collection

All GSHS-participating countries follow the same protocol for drawing a nationally-representative sample of middle school students. A two-stage cluster sampling design is used. In the first stage, whole schools are sampled using a probability proportionate to enrolment method. In small countries, a 100% sample of schools with eligible grade levels may be attempted; in larger countries, only a subset of schools are invited to participate in the GSHS. In the Polynesian region, for example, 23 schools from the Cook

Table 1
Characteristics of the four Polynesian countries that participated in the Global School-based Student Health Survey (GSHS) [54–56].

Country		Cook Islands	Niue	Samoa	Tonga
Year of GSHS data collection		2009	2010	2011	2010
Total number of GSHS participants		1274	141	2418	2211
Total number who answered at least one of the three questions about injuries		1207	134	2146	2020
GSHS participants (%) by sex and age (years)	Female	49.2	56.3	51.7	48.8
	Male	50.8	43.7	48.3	51.2
	≤12	8.9	26.2	5.6	4.4
	13	19.2	9.6	19.2	19.3
	14	19.0	11.4	39.9	29.4
	15	17.7	16.8	28.0	33.6
	≥16	35.1	36.0	7.4	13.3
Geography		15 islands grouped into Northern and Southern chains	1 island	2 main islands (Savai'i and Upolu)	More than 170 islands, of which about 50 are inhabited
Land area (km^2)		236	260	2842	747
Total population (2012)		21,000	1,500	189,000	105,000
% Below age 15 (2013)		28.5	24.7	37.8	37.2
% Urban (2013)		74.0	38.8	19.4	23.6
Life expectancy at birth (2012)		76 years	74 years	73 years	71 years
Physicians per 10,000 population (2006–2013)		13.3	30.0	4.5	5.6
Adolescent birth rate per 1000 females (2010)		24	17	44	20
Gross national income (GNI) per capita (US$, 2010)		12,653	–	3437	4524
% of the population below basic needs poverty line		28 (in 2006)	13 (in 2002)	27 (in 2008)	22 (in 2009)
Per capita total expenditure on health (US$, 2011)		511	1820	245	219