Rural and Remote Health

MEDLINE listed
Impact factor 0.878

ISSN 1445-6354

The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy

REVIEW ARTICLE

Unintentional injury prevention and the role of occupational therapy in the Solomon Islands: an integrative review

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Submitted: *19 November 2015;* ***Revised:*** *6 May 2016;* ***Accepted:*** *31 August 2016;* ***Published:*** *21 October 2016*

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Rural and Remote Health **16: 3810. (Online) 2016**

Available: http://www.rrh.org.au

ABSTRACT

Introduction: Unintentional injuries (injuries for which there is no evidence of a predetermined intent) are one of the leading causes of death worldwide, particularly in low- and middle-income countries (LMICs). Although evidence demonstrates unintentional injuries are preventable it is a public health challenge for many LMICs such as the Solomon Islands. Occupational therapists are well placed to contribute to injury prevention, as they have specialised skills to analyse the accessibility and safety of the environments within which people conduct their daily occupations. While the role of occupational therapy in unintentional injury prevention is well known in high-income countries, it is unfamiliar in LMICs, especially in the Solomon Islands. This integrative review aimed to explore the incidence of common unintentional injuries, and the burden in the Solomon Islands; and explore the potential role of occupational therapy in unintentional injury prevention in the Solomon Islands, based on current activities in LMICs.

Method: Articles were reviewed from six databases (Medline, CINAHL, OTDBase, OT Seeker, Scopus and PsychInfo). Five articles met the inclusion criteria for the first objective and 15 articles met the inclusion criteria for the second objective. These articles were thematically analysed where themes and codes associated with the research objectives were extracted and analysed.

Results: Unintentional injuries in the Solomon Islands reported in the literature included ocular trauma, falls from fruit trees and coconut palms, and road traffic crashes. Burden of injury reported was mostly associated with loss of productivity. Occupational therapists undertook rehabilitative, biomechanical, neurodevelopmental and educational roles in LMIC, focusing on tertiary and secondary injury prevention.

Rural-and-Remote-Health
The International Electronic Journal of Rural and Remote Health Research, Education Practice and Policy

Conclusions: This integrative review suggests that there is limited information regarding injury in the Solomon Islands. However, evidence is available in LMICs to suggest that occupational therapy services can play a potential significant role in unintentional injury prevention, demonstrating a need for establishing injury prevention within the occupational therapy role in the Solomon Islands.

Key words: accidents, injury prevention, LMIC, low- and middle-income countries, occupational therapy, Pacific islands, safety.

Introduction

Unintentional injuries (injuries for which there is no evidence of a predetermined intent) are one of the leading causes of death worldwide[1]. WHO estimates unintentional injuries account for more than 3.9 million deaths globally, and over 90% of these deaths are occurring in low- and middle-income countries (LMICs)[1]. Road traffic crashes (RTCs) and falls are the leading causes of unintentional injuries where RTCs account for 24% of all fatal injuries and falls account for 14%[1]. Other unintentional injuries include fire-related burns, poisonings and drowning[1]. Deaths and non-fatal consequences of injuries such as temporary or permanent disabilities, chronic pain and socioeconomic loss can have lasting impacts on the person, families and the communities being affected by the injury[1,2]. It was predicted the disability-adjusted life-years (DALYs) lost from unintentional injuries was over 94% of the total global DALYs in LMIC[2].

Evidence shows that unintentional injuries are preventable as demonstrated by decreased mortality rates from RTC in high-income countries (HICs) such as Australia and some LMICs[3-5]. Yet unintentional injury prevention is a public health challenge for many LMIC around the world[5-7].

Injury prevention is a multi-faceted process: a continuum of factors is associated with the occurrence of an injury[5]. These factors can be described in terms of the host (the person injured), agent (the force or energy), vector (the mechanism that applies the force) and the environment (both physical and social conditions under which the injury happens)[5]. Thus when developing injury prevention interventions all these factors should be considered. Interventions could be directed at (1) preventing the occurrence of injury (primary prevention), (2) minimising the severity of injury at the time of injury (secondary prevention) and (3) minimising the severity of injury after the injury has occurred (tertiary prevention)[5,8]. Primary prevention actions are focused on eliminating the injury from occurring (eg fencing around pools to prevent drowning)[9]. Secondary prevention focuses on minimising the amount of energy transferred to an individual such as the use of seat belts and air bags to prevent road traffic crashes[7]. Tertiary prevention aims to manage the impacts of injury on the person after injury occurrence, and this is where the majority of the health sector is involved[7].

Injury prevention requires a multisectorial input[10]. This could include the government, health and private sector. WHO has highlighted this in the guidelines for policy-makers and planners for injury and violence prevention[10]. However, a multi-sectorial approach can be challenging for many LMIC where economies are usually reliant on foreign aid, there is a vast populace with low socio-economic status', political instability can be a normality, and where health systems are overburdened[2,11]. Therefore, policy-makers (within the government and health sector) generally direct efforts towards more immediate and observable issues such as managing communicable diseases[2]. LMIC often have poor data recording systems, distorting the magnitude of the impacts of injury[6]. Therefore, injury prevention is often overlooked or not a priority in health policy planning[2,11]. This was one of the issues for the Solomon Islands.

Situating Solomon Islands

Solomon Islands is an archipelago LMIC, located in the Southwest Pacific region, with a population of approximately 561 231[12]. It consists of more than 900 islands scattered over a total ocean area of 1.3 million km^2 (exclusive economic zone)[13]. Less than 20% of the population lives in urban areas with a large population density distributed in the remote outer islands[14]. The capital, Honiara, is on the main island (Guadalcanal) and is home to approximately 66 000 people[14]. Almost all economic growth, services and employment opportunities are concentrated in the capital, Honiara[14]. Therefore, in terms of social and economic indicators, those living out in the rural areas/islands are more disadvantaged than their urban counterparts[14].

Solomon Islands is in the peace-making process after ethnic tensions that occurred in 1998 and then in 2005[14]. Consequently, infrastructure development is stagnant, with most of the country's finances sourced from foreign aid, accounting for over 60% of the gross domestic product in 2006–2011[14]. The economy is subsistence and cash crop agriculture, with less than 25% of the working population involved in paid work[14]. The majority of those living in the rural areas depend on subsistence farming[14].

Health care in the Solomon Islands is free and is regulated by the Ministry of Health and Medical Services (MHMS)[14]. There is a critical shortage of health personnel in the country with 1.9 health workers (doctors, nurses and midwifes) for every 1000 people[14]. This is below the minimum standard of 2.3 recommended by WHO[14]. Equal access to health care remains a challenge for the MHMS due to factors including the archipelago nature of the country and the high rural and remote population density[15,16]. Thus service delivery to these rural areas is costly and resource intensive to the health system[16].

WHO predicted unintentional injuries to account for 5.3% DALYs loss in 2008 and they were identified as the third leading burden of disease in the *National Health Strategic Plan 2011–2015*[15,17]. However, unintentional injury prevention appeared to be overlooked as a health priority[15]. Health priorities were focused on prevention and management of communicable and non-communicable diseases[15]. This is not uncommon for LMICs where health systems are already burdened with communicable and non-communicable diseases; thus, it becomes challenging to consider other issues such as injury[6]. Lack of adequate injury reporting systems is also a barrier to some of the MHMS health action plans[15].

Occupational therapy role in injury prevention

While many professions are involved in injury prevention, occupational therapy is particularly well placed. Occupational therapy is a client-centred profession that is concerned with promoting health and wellbeing through occupations[18]. Occupations are defined as the everyday activities and tasks that people participate in that give purpose and meaning to their lives[18]. Occupations can range from a task as simple as preparing a meal (self-care) to participating in paid employment (work) and to being able to enjoy a hobby such as fishing (leisure)[18]. In injury prevention, occupational therapists are specifically trained to critically analyse the activities of work, leisure and self-care that people are participating in, identify the potential risks and protective factors and then design strategies to reduce the risk of potential injury, in particular in environments such as the home, work or community[19].

The majority of the studies that have explored and discussed the occupational therapist roles in unintentional injury prevention have been undertaken in HICs. Here, occupational therapists provided injury prevention interventions such as falls prevention education and environmental modifications in the community/home for the older population[20,21], preventing road crash injuries among the older population[22,23], prevention of work-related injuries[24] and prevention of scarring after burn injuries[25].

In LMIC the limited occupational therapy literature focused on a tertiary preventative role in the prevention of unintentional injuries such as in disaster management[26,27], spinal cord injury management[28,29] and hand injury

management[30]. Although there was a general consensus that awareness of the occupational therapy role in injury prevention within LMICs is limited, it was identified that occupational therapists played a critical role in preventing and minimising the long-term physical and psycho-emotional impacts of the disabilities from injury[28-30].

In the Solomon Islands, there was limited information regarding occupational therapy services in the country. One study described a placement experience of two occupational therapy students from New Zealand[31]. This study highlighted the absence of occupational therapists within the allied health team at the hospital[31]. Likewise, a 2014 health profile report conducted for the country highlighted the absence of occupational therapy services[14]. This was confirmed by E. Taloafiri (physiotherapist, head of the rehabilitation unit at the National Referral Hospital (NRH)) where the first and only paid occupational therapists in the Solomon Islands left the country to practice in New Zealand (pers. comm., October 2015).

The allied health team at the NRH, which consists of physiotherapists, social workers and community-based rehabilitation workers, provides the required rehabilitative services for the Solomon Islands[14]. Various organisations such as the Australian Volunteers International and Japanese International Cooperation Agency often employ volunteer occupational therapists in the Solomon Islands; however, this is only on a short-term basis[32,33]. Occupational therapy services appear to be limited in the Solomon Islands.

Since there is limited information regarding occupational therapy services in the Solomon Islands, this literature review will explore the different roles that occupational therapists are undertaking in unintentional injury prevention in other LMICs to determine the potential of utilising these roles in the Solomon Islands. Likewise, it will explore the types of unintentional injury in the Solomon Islands.

Research objectives

To the authors' current knowledge this is the first integrative review to be conducted for the Solomon Islands regarding injury and the role of occupational therapy in unintentional injury prevention. This integrative review will therefore aim to answer two research objectives:

- to explore and describe the current understanding of the incidence, common types and the burden of unintentional injuries in the Solomon Islands
- to explore the potential role of occupational therapy in unintentional injury prevention in the Solomon Islands based on current occupational therapy activities in other LMICs.

Method

Design

An integrative literature review approach was undertaken to address the two research objectives. Integrative literature reviews allow for the inclusion of diverse methodologies (experimental and non-experimental research)[34], an in-depth exploration of this new area of study[35], and is proven to be relevant to evidence-based practice[34,35].

Search strategy and selection criteria

This integrative review was undertaken with two aims: (1) to explore the incidence, common types and the burden of unintentional injury in the Solomon Islands ('injury') and (2) to explore the role of occupational therapy in unintentional injury prevention in LMICs ('occupational therapy role'). Six databases (Medline, CINAHL, Scopus, PsychInfo, OTDBase and OTSeeker) were searched between 10 and 27 July 2015. A combination of keyword searching, synonyms and subject heading search strategies were used, depending on database functionality (Appendix I). The PRISMA guideline (http://http://www.prisma-statement.org) was used to provide a systematic approach to this integrative review. Figures 1 and 2 provide a summary for each search process[36].

The following inclusion and exclusion criteria were used:

- Articles published in English were included.

- All years (no time limit was applied to all articles) were included.
- Articles specifically discussing/outlined unintentional injuries or an unintentional injury classification (road traffic injuries, falls, burns, drowning, poisoning)[1] were included.
- Articles discussing intentional injuries (those that result from purposeful intent and can be self-inflicted and/or interpersonal[7]) were excluded.
- For the 'injury' section:
    - Articles were only included if the injuries were sustained by people in the Solomon Islands.
- For the 'occupational therapy role' section:
    - Articles that clearly and specifically identified the involvement of occupational therapists or occupational therapy were included.
    - Articles that explored general rehabilitation roles and community-based rehabilitation roles and did not have reference to occupational therapy were excluded.
    - Articles for which the study was undertaken in the Solomon Islands or an LMIC were included. (The list of LMICs was taken from the World Bank LMIC listing[37].)

Data analysis

Analysis was conducted independently for each research objective; however, the same procedure, the principles of the thematic analysis process outlined by Braun and Clarke, was applied[38]. This process entails an initial reading of the articles, initial category generation, initial code development, category/code reviewing, naming and defining categories/codes and producing the report[38].

Initially, studies were read and summarised into tables with the following categories: study design, location of study, injury type and summary of study findings. A process of data reduction was conducted where the summarised data in the initial categories were organised into more specific categories[35]. For the 'injury' section, categories included crude incidence rate, sustained injuries and body locations, injury location and burden of injury (Table 2). For the 'occupational therapy role' section, categories included injury type and body location, practice setting, occupational therapy role, team and injury prevention stage (Table 3).

The data within these categories were analysed where commonalities within the data were identified and organised into groups, which were then coded[38]. Codes were initially defined by the data itself and were refined where possible on existing coding from occupational therapy literature[18,39], the International Classification of Diseases injury coding from the Research Center for Injury Studies at Flinders University in South Australia[40], and primary healthcare literature[8]. The code definitions are presented in Table 1. These were then reviewed by the co-authors for consistency, relevance and content validity[34]. Outlier categories and codes were reviewed and eliminated, adapted or included where appropriate. Tables 2 and 3 display the outcomes of the analysis process.

For the injury section, a crude measure of incidence was calculated to identify injury incidence per annum per 100 000 people in the Solomon Islands. The data used in the analysis were extrapolated from the retrieved articles and the incidence rate was calculated using the following calculation:

> Incidence rate = (number of injury cases/population during that period)/(Yx100 000).
>
> where Y = number of years for which the data was collected and used if individual year population not available.

Population figures were derived from the World Bank website for the time period in which the injury counts were identified in the retrieved articles[12].

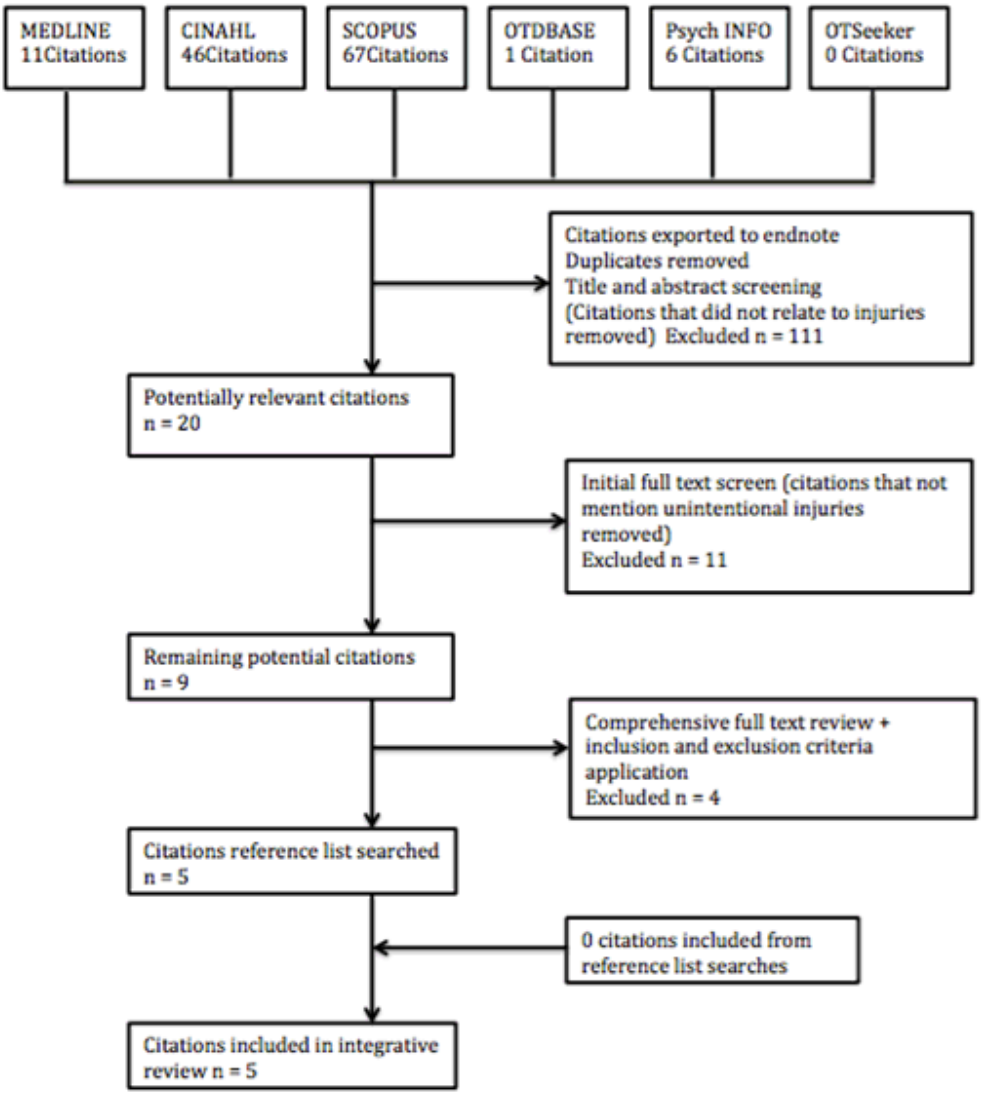

Figure 1: PRISMA flow for 'injury' section of systematic review.

A decision was made to not critically appraise the articles included in this review. The majority of the studies in this review ranked lower in the National Health and Medical Research Council evidence hierarchy due to the dearth of literature in this particular area of study[41]. The focus of this review was not on the quality of the studies, but on providing a preliminary description of literature that explores unintentional injury and the role of occupational therapy in unintentional injury prevention in LMICs. In light of this, data interpretations are conducted with caution, understanding that these studies are of low-level evidence on the spectrum of critically appraised studies[41].

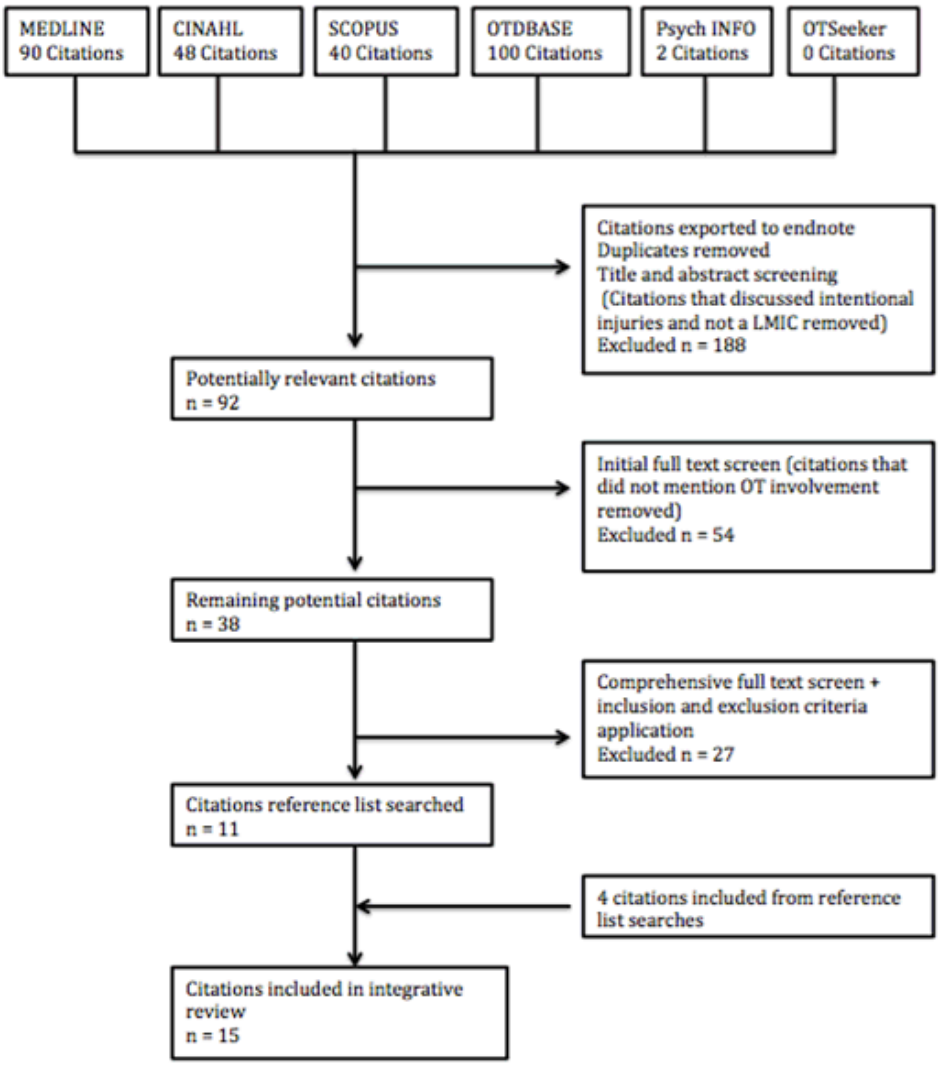

Figure 2: PRISMA flow for 'occupational therapy role' section of systematic review.

Results

Injury

Five articles met the inclusion criteria for information regarding unintentional injury in the Solomon Islands. Study designs included two retrospective studies, two descriptive case series and a prospective cohort clinic-based study. Two studies explored injuries from falls from fruit trees or coconut palms[42,43]. The remaining three articles explored road traffic crashes[44], ocular trauma[45] and soccer-related injuries[46]. Injury incidence per annum per 100 000 population was calculated to be 34.3 for ocular trauma, 12.1 for falls from fruit trees, 6.4 for road traffic crashes, 4.7 for soccer-related injuries and 4.2 for coconut palm-related injuries (Table 2). Common injuries sustained and body locations included fracture of both upper and lower limbs, spinal cord injury and penetrative injuries to the eye (Table 2). The most common places that injuries occurred were in the community and at home (Table 2). Productivity was a common injury burden identified by all five studies, and four of the five studies identified that males sustained most injuries. Only one article discussed the potential healthcare costs associated with injury[45].

Table 1: Classification of injury and occupational therapy role with codes and definitions

Injury		
Category	**Code**	**Definition and text reference**
Injury location	Home	Home premises, house, non-institutional place of residence, apartment, boarding house, driveway to home, garden/yard to home, path to home [40].
	Work	Industrial/construction area, farm, plantation [40].
	Community	Public roads, public playgrounds, public sports ground, community centre area [40].
Burden of injury	Productivity	A person's contribution to the family life and to the community [18].
	Healthcare costs	Direct costs of injury on the health system from hospitalisation, rehabilitation and transportation. Healthcare costs.
Occupational therapy role		
Category	**Code**	**Definition and text reference**
Practice setting	Institutions	General hospital, rehabilitation hospital/facility, residential facility, assistive living residence [39].
	Community	Community health centres, visiting health agencies/business, school or school board, post-secondary education institution [39].
	Industry	Association/government, industry/manufacturing [39].
	Unspecified	Practice setting not specified.
Occupational therapy role	Biomechanical	Roles include range of motion, strength and endurance exercises, addressing quality of movement in occupations [18].
	Rehabilitation	Roles include compensatory and occupation-focused interventions to facilitate independence in self-care, productivity and leisure occupations. Also includes equipment prescriptions, home and environmental modifications [18].
	Neurodevelopment	Includes neurological rehabilitation [18].
	Education	Includes education, training and capacity building [18].
	Miscellaneous	Encompasses non-occupational therapy specific roles.
Injury prevention stage	Primary	Promoting the health and wellbeing of the general population to prevent health damaging behaviour, ill health and improve quality of life [9].
	Secondary	Promoting the health of individuals where health-damaging behavior has already occurred, to change behaviour and prevent health moving to a chronic or irreversible stage [9].
	Tertiary	Promoting health of those with chronic conditions or disability to enhance quality of life and potential for healthy living [9].
Team	Team	Working with other health professionals and non-clinical staff.
	Alone	Working alone or within an occupational-therapists-only team.

Occupational therapy in LMIC

Fifteen articles met the inclusion criteria for this section. There were seven descriptive studies, two qualitative studies, two observational studies and one retrospective review, explorative study, cohort study and case study designs. Eight of these studies were conducted in Bangladesh[26,28-30,47-50], two in Haiti[27,51] and one each in Indonesia[52], Sri Lanka[53], Papua New Guinea[54], the Philippines[55] and Nepal[56] (Table 3). Common mechanisms of injury identified in these studies were natural disasters (earthquakes), accidents (road crashes and falling buildings), falls from trees and burns. Common sustained injuries included spinal cord injury, fractures, head injuries, amputations and burn injuries.

Table 2: Published studies exploring injury in the Solomon Islands

Citation	Purpose	Study design[†]	Data source[†]	Participant description	Injury			
					Crude Incidence rate	Sustained injuries and body location	Injury location	Burden of injury
Stewart, et al. 2015 [44]	To identify the causes and impact of road crashes	Retrospective study	Hospital records 1993–2012	*n*=699 cases Male: 73.1%	6.4	Fractures - 35.5% lower limb - 33 % upper limb	Community Work	Productivity
Negin, et al. 2014 [43]	To investigate tree-related injuries	Descriptive case series	Hospital records 1994–2011	*n*=1107 cases Male: 71%	12.1	Fractures - 59% upper limb - 12% lower limb	Community Work	Productivity
Baker, et al. 2014 [45]	To examine the cause of ocular trauma and the risk factors for infection	Prospective cohort clinic-based study`	Hospital records 2005–2007	*n*=507 cases Male: 70.9%	34.3	- Penetrating injuries - Open globe injuries	Home Work	Productivity Healthcare costs
Mulford, et al. 2001 [42]	To investigate coconut palm related injuries	Retrospective study	Hospital records 1994–1999	*n*=105 cases Male: 50%	4.2	Fractures - 60.1% upper limb - 16.3% spinal	Community Work	Productivity
Fegan and Glennon 1989 [46]	Significance of soccer injuries in the rural Solomon islands	Descriptive Study	Hospital records 1985–1986	*n*=13 cases	4.7	Fractures - lower limb	Community	Productivity

[†] Data source for all studies except ocular trauma were taken from the National Referral Hospital that is located on the Guadalcanal Island in the capital city. There are nine other hospitals located on the other eight main Islands within the country.

Table 3: Published studies exploring occupational therapy role in low- and middle-income countries

Citation	Purpose	Study design	Participant description	Location	Injury type and body location	Occupational therapy role			
						Practice setting	Role	Team	Injury prevention stage
O'Brien and Hardman 2013 [30]	To describe the experiences of hand therapists (OT) building therapy skills in a developing country	Qualitative study	*n*=9 Hand therapists	Bangladesh	Hand injuries Unspecified – possibly burns, trauma	Community	Rehabilitation Education	Team	Tertiary
Habib, et al. 2014 [47]	To explore a range of low assistive devices available for persons with SCI	Descriptive study	Unspecified	Bangladesh	SCI Unspecified – possibly falls from trees	Institutions Community	Rehabilitation	Team	Tertiary
Habib, et al. 2013 [26]	To explore the role of OT in disaster management	Explorative qualitative study	*n*=6 Local OT	Bangladesh	Fractures, nerve injuries, soft tissue injury, SCI, amputees, burns Unspecified body locations	Industry Institutions Community	Biomechanical Rehabilitation Education	Team	Primary Secondary Tertiary
Hossain, et al. 2013 [49]	To describe the role of OT during the Rana Plaza tragedy	Descriptive study	*n* unspecified (possibly 250) Patients	Bangladesh	SCI, amputations, fractures – upper and lower limb	Institutions Community	Rehabilitation Biomechanical	Team	Tertiary
Santoso 2013 [52]	Experiences of OT students on volunteer fieldwork following a natural disaster	Descriptive study	*n*=40 OT students	Indonesia	Fractures, brain injury, SCI Unspecified body locations	Institutions Community	Rehabilitation Education	Alone	Tertiary
Ullah and Erna 2012 [28]	To share the experiences of a recent OT practice initiative for assisting in successful transition from rehabilitation phase to home setting	Descriptive study	Unspecified	Bangladesh	SCI	Community	Rehabilitation Education	Team	Secondary

Table 3: cont'd

Citation	Purpose	Study design	Participant description	Location	Injury type and body location	Occupational therapy role			
						Practice setting	Role	Team	Injury prevention stage
Ullah, et al. 2015 [29]	To examine the vocational assessment process and interests of persons with SCI undergoing rehabilitation at CRP	Retrospective review	*n*=2 OT *n*=83 SCI patients	Bangladesh	SCI	Community	Rehabilitation	Team	Secondary
Duque et al. 2013 [55]	To outline the process undertaken to convene the OT disaster preparedness and response plan	Descriptive study	*n* unspecified OT	Philippines	Natural disaster related injuries Unspecified body locations	Industry	Education Miscellaneous	Team	Primary
Welage and Liu 2008 [53]	A review of a community integration program for people with SCI	Descriptive study	Unspecified	Sri Lanka	SCI	Institutions	Rehabilitation	Team	Secondary
Rodgers-Wilson 1982 [54]	To describe the role of the OT in Papua New Guinea	Descriptive study	Unspecified	Papua New Guinea	SCI, head injuries	Institutions Community	Biomechanical Rehabilitation	Team	Tertiary Secondary
Prabhaka and Thakker 2004 [50]	To evaluate and improve the status of rehabilitation of community dwelling SCI patients	Observational study	*n*=447 SCI patients	Bangladesh	SCI	Institutions Community	Rehabilitation	Team	Tertiary
Riggers 2011 [27]	To explore the experiences of an OT who aided in the emergency responses after the Haitian earthquake of 2010	Case study	*n*=1 OT	Haiti	SCI, amputations	Institutions	Biomechanical Neurodevelopment	Team	Tertiary
Hansen, et al. 2007 [48]	To assess the success of a work rehabilitation program at CRP	Observational study	*n*=109 Patients	Bangladesh	SCI	Community	Biomechanical Rehabilitation	Team	Tertiary
Klappa, et al. 2013 [51]	To describe the current roles of therapists (physical and occupational) in disaster relief	Qualitative study	*n*=13 PT=10 OT=3	Haiti	Burns, fractures, SCI, head injuries Unspecified body locations	Institutions Community	Biomechanical Rehabilitation Neurodevelopment Education	Team	Tertiary Secondary
Scovil, et al. 2012 [56]	To evaluate ongoing health and community reintegration of patients with SCI after discharge from inpatient rehabilitation in Nepal	Cohort study	*n*=37 SCI patients	Nepal	SCI	Community	Rehabilitation Education	Team	Secondary

CRP, Centre for the Rehabilitation of the Paralysed. OT, occupational therapy/therapist. PT, physical therapist. SCI, spinal cord injury

Occupational therapists were predominantly practising in the community and institutional (hospital) setting; only one study explored the role of occupational therapy in a government (industry) setting[26]. Occupational therapy scope of practice was more focused on rehabilitative and biomechanical roles and the occupational therapists were mostly working in a team (explored by all studies but one). Members of the team included a team of occupational therapists or a team with other health professionals including doctors, nurses, physiotherapists, spiritual counsellors, social workers and prosthetists/orthotists. According to this review, occupational therapists were predominantly involved in the tertiary and secondary stage of injury prevention and had very limited contribution in the primary phase of injury prevention (Table 3).

Discussion

There is a dearth of information on injury, its prevention and the role of occupational therapy in injury prevention in the Solomon Islands and LMIC. This review provides a glimpse into the types of unintentional injuries that are occurring in the Solomon Islands and the potential occupational therapy roles in injury prevention that can be translated into the

Solomon Islands context from the current activities in LMICs.

Injury in the Solomon Islands

Ocular trauma was identified as the highest occurring injury compared to road traffic crashes and falls from fruit trees in the Solomon Islands (Table 2). It should be noted that the ocular trauma study was the only study to utilise data from more than one hospital. Data from provincial hospitals on the outer islands were used with those from the NRH[45]. Hence the incidence rates encompassed more presentations and admissions compared to the studies for road traffic crashes and falls from fruit trees, which only used data from the NRH. Thus the crude incidence rates for road traffic crashes and falls does not represent the actual rate for the Solomon Islands, as injuries could be occurring on other islands and not recorded or referred to the NRH. Reports published by WHO have indicated that the rates of road traffic crashes are predicted to rise in the Solomon Islands, due to the current increase in urbanisation[14,57]. However, most of the figures that WHO utilised were derived from statistical predictions rather than from actual injury data from the Solomon Islands[57]. This is a depiction of how inadequate information/data can potentially distort the interpretations of the impacts of injury on a population.

Common injuries that people sustained included fractures and spinal cord injury, and these injuries predominantly occurred at home, within the community and to a lesser extent in the workplace (Table 2). Less than 25% of the Solomon Islands population are involved in paid work and the rest are subsistence farmers, thus the prevalence of injury occurrence in home and the community[14]. Although this information is limited, it provides a glimpse into the types of injury people sustain and where they occur, allowing health professionals, such as occupational therapists, to target injury prevention actions effectively. For example, knowing that children sustain most of the injuries from ocular trauma in the home and within the community[45], occupational therapists can target injury prevention strategies to families.

The main burden of injury was the loss of productivity. Injuries were predominantly sustained by the male population within their economically productive ages of 15–44 years[42-45]. For the purposes of this review, economic productivity was defined within the scope of subsistence farming: to provide food for the family/community and for market produce[14]. In the Solomon Islands, males are most often the income earners for a family[58]. However, due to the *wantok* system, an unwritten social contract that binds extended families via a set of mutual obligations and reciprocal support, a male is often the only provider for a large extended family[58]. If this person is injured and is unable to work, the entire extended family may become economically vulnerable[58]. A loss in such productivity means a lack of participation in meaningful occupations, resulting in occupational disruption to the injured person and the family[18].

Although healthcare cost was identified as a burden, the study that highlighted this burden acknowledged that there was limited information available to quantify this burden[45]. The issue of late presentation to hospitals resulting in complications that required expensive and intensive hospitalisation was discussed in relation to the burden of healthcare costs[45]. Factors including reliance on traditional medicine, lack of healthcare education, geographical isolation and cost of travel contributes to late presentations in the Solomon Islands[14,16,45]. Likewise, these can impact on health service delivery to the outer rural and remote islands[16]. This highlights the importance of injury prevention in the rural and remote areas in the Solomon Islands, where access to healthcare facilities are limited.

Role of occupational therapy in injury prevention

The few studies identified provide an overview of the range of roles that occupational therapists are undertaking in LMICs. Almost all the studies described the occupational therapist's role in injury prevention at the tertiary prevention stage. Occupational therapists were predominantly focused on enhancing quality of life after injury to ensure that people have as much independence as possible within their daily lives[26-30,47-56]. These roles encompass remediation (range of

motion exercises, upper limb exercises, splinting), compensatory actions (assistive equipment prescription, home modifications) and return-to-work programs (vocational trainings)[26-30,47-56]. Occupational therapists also undertook educational roles including capacity-building training[26,27,30,52]. Although there were some differences in the mechanisms/causes of injury between the LMICs and Solomon Islands, the resulting sustained injuries were similar (fractures and spinal cord injuries). Thus the identified occupational therapy roles in these LMICs have the potential to be applied in the Solomon Islands.

Occupational therapists primarily worked as part of a team. The importance and benefits of working as part of a multidisciplinary or an interdisciplinary team to both the health professionals and patients were highlighted by many studies in HICs and LMICs[59,60]. These studies emphasised that team care approaches can lead to a better quality of care to the patients and often result in more patient satisfaction in regards to rehabilitation[59,60]. Therapists working in rural and remote settings or in under-resourced contexts often are the sole practitioners in their specialised fields, thus are recommended to collaborate with other health professionals[61]. It is recommended that occupational therapists practising in the Solomon Islands work in collaboration with the rehabilitation and medical teams at the hospital in order to provide effective injury prevention measures.

Within this review occupational therapists were predominantly providing interventions at the secondary and tertiary phases of prevention. Only two studies discussed an occupational therapy role in the primary prevention stage[26,55]. Bourke-Taylor and Hudson discussed that, despite the current push towards prevention in LMICs, occupational therapists working in these settings find themselves practising within the secondary and tertiary stages of prevention, undertaking the traditional rehabilitation roles[62]. Occupational therapists can be seen to have a narrow scope of practice in rural and remote settings where there is lack of awareness of the occupational therapy role among other health professionals and clients[30,60]. This limits occupational therapist roles to 'hand therapists' or 'rehabilitation of physical function [therapists]'[30,63]. As stated, occupational therapists practising in rural and remote settings are often the only therapists[61]. Consequently, they are faced with challenges including undertaking diverse duties, and managing complex and large caseloads, and they often have little or no time for prevention and can only focus on providing immediate health care[61,64,65]. Yet it is recommended that occupational therapists setting up in LMICs should initiate participation in primary prevention where possible[62].

This literature review did not find information on training, recruitment and retention of occupational therapists in injury prevention in LMICs. However, training, recruitment and retention of occupational therapists in LMICs with rural and remote settings has been identified as a challenge by some studies[65,66]. Common barriers to service provision experienced by occupational therapists practising in rural and remote areas include geographical location, transport costs, travel times, limited health professionals, lack of professional supports and opportunities for professional growth[65,66]. This is also likely to be true in the Solomon Islands where large population densities are distributed among the remote outer islands.

Economic incentives are one of the largest contributors to attrition of skilled staff such as occupational therapists from LMICs to HICs[30]. In the Solomon Islands the lack of professional support such as the presence of an occupational therapy association or an advocate group and low economic incentives could be the barrier to retention of occupational therapists[14,65]. Thus strategies such as financial incentives, provision of professional supports and opportunities for professional growth should be considered when establishing occupational therapy services in the Solomon Islands to maintain continuous training, recruitment and retention.

Recommendations for future studies

Despite limited literature it could be argued that occupational therapists have the potential to play a significant role in injury prevention within LMICs as prevention is an important part

of their training[19]. Thus it is recommended that steps be undertaken to establish occupational therapy in the Solomon Islands. Krefting outlined four strategies that could aid the development of occupational therapy services in LMICs: (1) documenting the extent of disability (injury), (2) development of a comprehensive rehabilitation plan, (3) prioritising needs and (4) developing educational models[67]. The principles within these strategies were utilised by occupational therapists setting up services in Bangladesh and the Dominican Republic and were shown to be a success[30,62].

Utilising these studies as examples, future studies can explore how occupational therapists can apply these strategies to assist in the establishment of occupational therapy in the Solomon Islands. However, there is also a need to understand the country's economic, social and political context and the rural and remote nature of the Solomon Islands when considering developing occupational therapy services[62,63].

Due to limited data regarding unintentional injuries in the Solomon Islands, it is recommended that an in-depth study of injuries in the Solomon Islands be undertaken. Likewise, future studies should consider an audit of the current reporting system in order to provide a better understanding of the burden of injuries in the Solomon Islands.

Limitations

While this present review focuses on unintentional injuries, it is acknowledged that a number of studies relating to intentional injuries such as domestic violence in the Solomon Islands were excluded. Intentional injuries could be explored in future research when a comprehensive injury reporting system has been established, as this will provide a more complete representation of the burden of injury in the Solomon Islands.

The potential of not finding all relevant articles relating to this research is a limitation. An attempt has been made to ensure that all LMICs were included within the search terms/strategies by incorporating all the LMICs listed by the World Bank; however, there is still the likelihood of potentially overlooking some countries due to the broad nature of LMICs.

This review only included peer-reviewed articles. An initial search of government websites such as WHO and the Solomon Islands statistical website presented reports with either incomplete injury-related data or the reports were unsuitable for analysis in this review. A systematic research of reports published by government websites such as WHO, United Nations and World Bank could potentially provide more information regarding the incidence of unintentional injury in the Solomon Islands.

This review focused on the role of occupational therapists and used LMIC data to explore this role in more detail. The authors were unable to find any articles that describe who is providing current unintentional injury prevention services in the Solomon Islands and acknowledge that occupational therapists are only one group who are trained to provide this service.

Conclusions

This is the first time to the authors' knowledge that an attempt has been made to explore unintentional injuries and the occupational therapy role in unintentional injury prevention for the Solomon Islands. This review identified ocular trauma, road traffic crashes and falls from fruit trees as injuries in the Solomon Islands; however, it is likely that this is an underrepresentation of the types of injury occurring. Occupational therapists were identified as having the potential to significantly contribute towards injury prevention, particularly in facilitating independence and quality of life after injury (tertiary prevention). Only a few studies highlighted occupational therapists' involvement in primary prevention of injury, although occupational therapists were encouraged to increase their participation in primary prevention interventions.

There was limited literature regarding occupational therapy in the Solomon Islands, therefore it is recommended that future studies should consider the potential of initiating the

establishment of occupational therapy in the Solomon Islands. Likewise, recommendations are made for future research to consider an audit of the current injury reporting system and an in-depth exploration of all injuries in the Solomon Islands to assist in the development of effective injury prevention interventions.

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Appendix I. Search strategies

Database	Search terms
For injury in the Solomon Islands	
MEDLINE	Solomon Islands "Wounds and Injuries", Accidents
CINAHL OTDBASE OTSeeker	"Solomon Islands"
Scopus	Solomon Islands Wounds and injuries" injury , injuries, unintentional injury", accidents, drowning, poisoning, "road crash*", "road accidents", "hand Injuries", "arm injuries", "abdominal injuries", "bites and stings, "animal bites", falls, "fall injur*", "electrical injur*", fractures, burns, dislocations, "sports injuries", "back injuries", "athletic injuries", "occupational injuries", "head injuries", "leg injuries"
PsychInfo	
For occupational therapy In LMIC	
MEDLINE CINAHL	Occupational therapy "Wounds and Injuries", Injury and wounds, Accidents Developing count*, Melanesia, Micronesia, guam, palau, Polynesia, "pitcairn island", samoa, tonga, "pacific islands", Africa, "west indies", "south America", asia (southeastern western), "indian ocean islands", indonesia
Scopus PsychInfo	Occupational therap* "wounds and injuries", "unintentional injury", accidents, drowning, poisoning, "road crash*", "road accidents", "hand Injuries", "Arm Injuries", "Abdominal Injuries", "bites and stings", "animal bites", falls, "fall injur*", "electrical injur*, fractures, burns, dislocations, "sports injuries", "back injuries", "athletic injuries", "occupational injuries", "head injuries", "leg injuries" "developing countr*", "low to middle income countr*", "third world countr*", Afghanistan, Benin, "Burkina Faso", Cambodia, "Central African Republic", Chad, Comoros, Congo, Eritrea, Ethiopia, Gambia, Guinea, Haiti, Korea, Iberia, Madasgascar, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Somalia, "South Sudan", Tanzania, Togo, Uganda, Zimbabwe, Armenia, Bangladesh, Bhutan, Cameroon, Congo, Egypt, "El Salvador", Guatemala, Honduras, India, Indonesia, Kenya, Kiribati, Laos, Lesotho, "Micronesia Federal State", Morocco, Myanmar, Nigeria, Pakistan, "Papua New Guinea", Philippines, "Solomon Islands", Samoa, "Sri Lanka", Sudan, Swaziland, "Syrian Arab Republic", "Timor-Leste", Ukraine, Vanuatu, Vietnam
OT Seeker	fall* road traffic crush* accident* Drown* Poison* Burn* Unintentional injur* Third world, developing country, low to middle income country
OTDBASE	developing country, low to middle income country