

Medicine

Sri Lanka Journal of Forensic Science & Law



Official Publication of the

DEPARTMENT OF FORENSIC MEDICINE
FACULTY OF MEDICINE
UNIVERSITY OF PERADENIYA
SRI LANKA



Vol. 4 No. 2
December 2013
Biannually
ISSN 2012-7081

Contents

- 1. Editorial**
Some impediments in the Sri Lankan substantive and procedural law in achieving justice through forensics.
Induwara Goonerathne **1-2**
- 2. A potentially preventable fatal outcome in a patient who developed cerebral malaria.**
Vidanapathirana M, Munasinghe K.R., Benaragama D.H. **3-5**
- 3. Analysis of the domestic legal framework in relation to the right to health for internally displaced persons in Sri Lanka.**
Wickramage Kolitha & Senavirathne Wasantha **6-20**
- 4. A study on awareness of "Legally accepted age limits" among school children in Kandy District Sri Lanka.**
Vadysinghe A.N., Munasinghe A., Abeysekera Y., Premasinghe K., Gamage S.M.K., Dassanayaka P.B. **21-26**
- 5. Stature estimation from the anthropometric measurements of foot outline in adult indigenous melanau ethnics of east Malaysia by regression analysis.**
Hairunnisa Bt Mohd Anas Khan & T. Nataraja Moorthy. **27-35**
- 6. An unusual case of infanticide by internal compression of airways - A case report.** Rohan Ruwanpura, Sriyantha Amararatne & Kumudu Dhahanayake **36-39**
- 7. Instructions to Authors** **40**



Sri Lanka Journal of **Forensic** *Medicine*
Science & Law

A peer reviewed journal
Published by Faculty of Medicine, University of Peradeniya, Sri Lanka.

Editor

Dr. Induwara Gooneratne
Dept. of Forensic Medicine
Faculty of Medicine
University of Peradeniya
Sri Lanka

Tel. 094-81-2388083 / 2392151
E-mail : induwarag@yahoo.com

Editorial Board

- Prof. Ravindra Fernando, MBBS, MD, FCCP, FCGP, FRCP (London), FRCP (Glasgow), FRCP (Edinburgh), FRCPath (UK), DMJ (London)
Senior Professor
Dept. of Forensic Medicine & Toxicology
Faculty of Medicine, University of Colombo
- Dr. L.B.L. De Alwis, MB, BS (Cey), DLM (Colombo), MD (Colombo)
Chief Consultant JMO (Retired), Colombo
- Dr. Collin Seneviratne,
BSc, MSc, PhD (UK), MFSSoc
Forensic Toxicologist,
ROAR Forensics, Malvern Hills Science Park, Geraldine Road,
Worcestershire, WR14 3SZ
- Dr. Induwara Gooneratne,
BDS, Dip. in Forensic Medicine, MSc, MPhil (For.Med), LL.M (USA), DTox, DHR, Attorney-at-Law
- Dr. Dinesh Fernando, MBBS, MD, DLM, DMJ (Lon.)
- Dr.(Mrs) D.H. Edussuriya, MBBS, MPhil (For.Med.)
- Dr. Amal Vadysinghe, MBBS, DLM, MD (Col.), D-ABMDI (USA)
- Dr. K.A.S. Kodikara, MBBS, MD, DLM, Attorney-at-Law

International Advisory Board

- Prof. Corrine Parver, JD
Professor of Health Law & Director, Health Law & Bio Ethics Project
American University, Washington DC, U.S.A.
- Prof. Derrick Pounder,
MB, ChB, FRCPA, FFPPathRCPI, MRCPPath, FHKCPath
Professor & Director
Centre for Forensic & Legal Medicine, University of Dundee, UK
- Prof. D. Ubelaker, PhD, DABFA
Consultant to FBI & Adjunct Professor
Smithsonian Institute, Washington DC, U.S.A.
- Prof. Michael S. Pollanen, MD, PhD, FRCPath, DMJ (Path), FRCPC
Chief Forensic Pathologist
Ontario Forensic Pathology Service, Canada

EDITORIAL

SOME IMPEDIMENTS IN THE SRI LANKAN SUBSTANTIVE AND PROCEDURAL LAW IN ACHIEVING JUSTICE THROUGH FORENSICS.

Induwara Goonerathne

Dept. of Forensic Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

The object of this paper is to highlight some curtailments and impediments apparent and practically operative in the procedural and substantive Law in Sri Lanka in connection to forensic investigations that hinder administration of justice. It is the belief of the author that a critical examination of these issues at least will initiate a thinking process in the minds of decision makers, practitioners and/or concerned public.

The Sri Lankan law prevailing in connection to forensic investigations dates back to colonial era and seem to only regard government officers or those officers who are attached to the state are as qualified and accepted in the law to conduct investigations and provide reports to courts on a forensic matter. This fact is true for many areas of forensic investigations including fingerprint analysis toxicology analysis or hand writing analysis. Because of this reason, private practitioners (if there are) in these fields or retired officers from previous state practice(if they want to), are kept away structurally and functionally from the justice administration process. In the fields of finger printing, hand writing or toxicology the substantive law categorically exclude private practitioners. Not only the statutory law excludes private practitioners but also they exclude any expert in these fields other than the officers concerned in the Government Analyst department or the officer of the police department for fingerprints. For example, the law and practice in Sri Lanka does not allow a private expert on fingerprint or hand writing or toxicology to primarily involve in

the investigatory process or provide a report in the first instance nor does the law seem to allow an expert in a university or another state department except at the government analyst department. Due to this reason, not only several university officers who were trained in these specialities had to migrate leaving a vacuum but also research and development in these fields hindered significantly let alone the obstruction on developing parallel experts in these fields in non-governmental or university sectors. As a result the government analyst department and the police departments have been inundated with an unbearable case load that delays court proceedings. Although the evidence law may allow a defence opinion in court it is not practically possible that the sample will be allowed to be analysed by a private practitioner in the first instance. The police and the courts would follow the 'routine' which is to send the samples to the government analyst department. The courts seem to be satisfied as long as the sample is sent for analysis at the government analyst and does not seem to explore experts elsewhere. This impediment has resulted in minimal research outcome in the fields of forensic toxicology, finger print, handwriting or ballistics in Sri Lanka. So far no university has been able to retain a trained person in these aspects due to the structural confinement of these specialities to Government Analyst department. Those who were trained in universities with relevant PhDs had to migrate elsewhere due to these restrictions. Neither the government analyst department nor the police or other ministries could train an expert with a

desirable PhD degree in these fields. The author strongly believes in the establishment of specialities such as ballistics, toxicology, finger and hand print analysis, anthropology etc at least in universities to improve research and development in these areas and to train and provide a second generation of these specialities to the nation. It is not possible to develop these areas in universities unless the restrictions and obstacles are lifted so that university or private laboratory scientists could not only engage in teaching training and research in these areas but also provide expert evidence in court which will substantiate their research and training material.

The scenario was different for DNA analysis in Sri Lanka. The court and the Sri Lankan system happily allowed DNA investigations and reporting to be carried out by a private Gene lab in Sri Lanka. By the time the relevant law was formed in Sri Lanka, DNA evidence was not available, therefore, it was possible for DNA to be investigated in a private laboratory. This move seems to have been successful. The other factor was that there was no DNA lab available in the state sector for many years in Sri Lanka other than this private laboratory. Therefore the state had to depend on this private laboratory to save money from sending samples abroad.

Similar restrictions are apparent for wildlife forensics as it is restricted to wild life department .It seems that the wildlife department has not specifically trained personnel in these areas of forensics. This aspect hinders the services of university experts already existing with such training, yet unable to provide their services due to these structural and attitudinal obstacles .Forensic anthropology is a separate branch of forensics but in Sri Lanka forensic anthropology cases are traditionally referred to the judicial medical officer amidst many of their other forensic pathological referrals. The universities have trained personal in forensic anthropology however their services and training are masked by these traditional practices of police and

courts. The ignorance of courts and police about sciences and experts available other than forensic medicine and pathology is one reason for cases not being referred to experts other than judicial medical officers.

Forensic odontology too is referred to the judicial medical officers traditionally and most dental injuries are reported by judicial medical officers in Sri Lanka. By educating the police and courts on the availability of forensic odontologists and making structural changes in the law and procedure will enhance the utilization of these experts in the country.

In regard to post mortem examinations the criminal procedure of Sri Lanka is very clear as to who these can be referred to and when. The law does not exclude private medical practitioners or ayurvedic medical practitioners from conducting post mortems but the traditional practice in Sri Lanka seem to popularly involve government medical officer/judicial medical officer at many times excluding the judicial medical officers of universities.

In order to provide justice, in order to develop the science and research in these areas of forensics it is very important and relevant to understand the impediments that prevails in the substantive and procedural legal structure, in the attitude of parties in order to make relevant changes to move forward with the rest of the world. It is also important to realise the negative role of egoistic attitudes, ill practises and hegemony of dominant forensic practitioners not only to serve justice but also to develop these fields for the nation as universities has the sole responsibility and authority of developing these disciplines and expertise for the future. However, universities cannot and will not be able to fulfil their obligations when other impediments such as those described above combined with the ego and political practices of some perceived powerful personnel and groups are identified and urgently addressed.

A POTENTIALLY PREVENTABLE FATAL OUTCOME IN A PATIENT WHO DEVELOPED CEREBRAL MALARIA

Vidanapathirana M.¹, Munasinghe K.R.², Benaragama D.H.³

¹Senior Lecturer, Department of Forensic Medicine, ³Senior lecturer, Department of Pathology, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka.

²Registrar, Office of the JMO, Teaching Hospital Karapitiya, Sri Lanka.

INTRODUCTION

The incidence of malaria in Sri Lanka has reduced significantly due to the effective prevention programme to eradicate malaria by 2014. Only 124 new cases were found in 2011¹. Early identification, treatment and effective follow up are the main targets of achieving this goal. Malaria was the most commonly diagnosed disease among tourists staying for a short period in endemic areas of tropical countries².

Case report

A 34 year old male presented with fever after returning from India following one month stay without anti-malarial prophylaxis. Four days after return to Sri Lanka, he developed fever with chills and rigors. On the 3rd day of fever, he was admitted to a tertiary care hospital with headache, dizziness and mild cough.

On admission, his urine output was low and the colour was dark. He had splenomegaly and cervical lymphadenopathy. He did not have bleeding tendency or neck stiffness. Although the diagnosis of malaria was suspected, anti-malarial treatment was not commenced as his fever spikes settled a few hours after the admission.

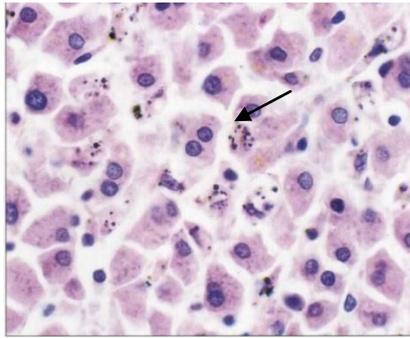
He developed mild fever on the day 2 of admission and investigations showed WBC 14,500 (Neutrophil 80%, Lymphocytes 14%,

Eosinophils 2%), Hb 16.5 g/dl, PCV was 51 % and platelet count was 190,000/mm³. SAT was negative. His blood picture was negative for malaria parasites and he was discharged by the on-call physician at noon. Before leaving hospital he developed bradycardia, sweating and palpitation. In the evening, he developed a seizure and progressed to loss of consciousness with brisk lower limb reflexes.

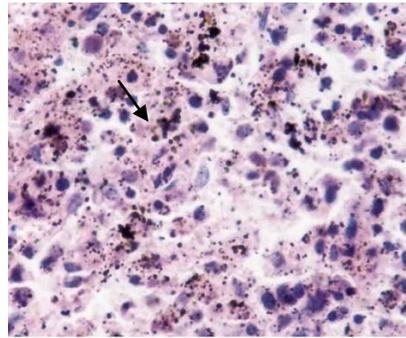
A diagnosis of cerebral malaria or intracerebral haemorrhage due to dengue was suspected and IV quinine, dexamethasone and antibiotics were given in the intensive care unit. CT brain was not done. Approximately 30 hours after admission, he died In spite of intensive care treatment.

At autopsy there was froth from nose and mouth with severe pulmonary oedema. He had splenomegaly (400g) and fatty liver (2kg). Also he had severe cerebral oedema with focal haemorrhages.

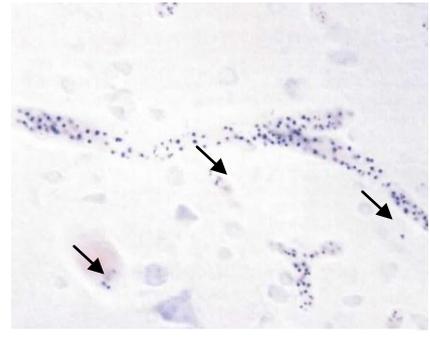
Histopathology of liver (photomicrograph 01) and spleen (photomicrograph 02) showed brown-black pigment in the RBCs and macrophages. The brain showed cerebral oedema. Blood vessels of the brain were filled with parasitized RBC containing malarial pigment and pigment was also found in brain tissue (Photomicrograph 03). The cause of death was given as compatible with cerebral malaria.



Photomicrograph 01- Malarial pigments in hepatocytes (arrow) (H and E stain x 40)



Photomicrograph 02- Malarial pigment in splenic macrophages (arrow). (H and E stain x 40)



Photomicrograph 03 - Cerebral oedema with occlusion of blood vessels by parasitized RBCs. Pigment was found (arrows) within brain tissue also (H and E stain x 40)

DISCUSSION

Malaria is still the cause of death more than any other communicable diseases except tuberculosis². Adhesion of parasitized RBCs to vascular endothelium results in an immune mediated response and haemostatic derangements. Injury to the endothelial cells of the cerebral vessels results in subsequent breakdown in blood brain barrier. Therefore, this is a complex multi-system disorder and causes parallel dysfunction of other organs².

Most common causes of splenomegaly include infectious mononucleosis, leukaemia and malaria³. Fever with chills and rigors and a palpable large spleen on admission were suggestive of malaria. Absence of fever spikes within the initial few hours of admission could have delayed in commencing anti-malarial treatment.

The 'diagnosis of malaria' is made in the presence of asexual forms of *P. falciparum* in the peripheral blood smears⁴. The decision to discharge the patient on the next day noon may have been due to the absence of malarial parasites in the peripheral blood, absence of fever spikes and the negative SAT. Although a higher density of parasites appear in circulation during fever paroxysms, it is important that blood films are obtained several times daily and for several days to identify parasites in patients with low density infections, and a single negative blood picture do not preclude the diagnosis of malaria or cerebral involvement⁵.

Further, when more than one physician is involved in the management, it is important to obtain the views of the other physicians before discharging the patient, especially if there is history of travel to malaria endemic areas.

The patient was a febrile at the time of the discharge. Though sudden deterioration of an already discharged patient is rare, such circumstances are reported⁶. Features such as rigidity of limbs and frothing were suggestive of an episode of seizure. Despite delay, the clinicians started a loading dose of IV quinine as treatment of cerebral malaria pending a CT brain to exclude natural or traumatic Intracerebral haemorrhage. The clinical criteria of diagnosis of cerebral malaria include unarousable coma, exclusion of other encephalopathies and the confirmation of *P. falciparum* infection⁵. For confirmation of *P. falciparum*, parasite must be demonstrated in peripheral blood smear or bone marrow smear during life or in a brain smear after death⁶. This patient had seizures and coma but the blood picture was not positive for malaria.

Froth at nose and mouth at autopsy further corroborated the possible episode of a seizure at terminal stages. Although splenomegaly and inguinal lymphadenopathy were found, diseases such as IMN, haematological malignancies, etc were excluded due to the absence of supportive clinical and laboratory findings. However, presence of malarial pigment in liver and spleen on microscopic examination (photomicrographs 01 and 02) was compatible with a diagnosis of malaria.

Cerebral malaria occurs when *Plasmodium falciparum* parasitizes large numbers of RBCs, and the capillaries in the brain become blocked by agglutinated masses of parasite-containing RBCs⁷. Further, there is haemorrhage around the blocked vessels. Small necrotic and haemorrhagic foci can be seen within the cortex of the cerebrum and cerebellum, and in the cerebellar hemispheres and peduncles⁷. The brain vessels are plugged with parasitized RBC, each containing dots of haemozoin malarial pigment⁷. The focal haemorrhages around vessels, are probably related to local hypoxia due to the vascular stasis and focal inflammatory reactions (Durck's granulomas)⁷. With severe hypoxia, there is degeneration of neurones, focal ischaemic softening and occasionally scanty inflammatory infiltrates in the meninges⁸. Blockage of small vessels of the brain by parasitized RBCs is a particularly important feature of cerebral malaria, a serious and often fatal condition⁹. The malaria parasite appears as small basophilic 'rings'⁹.

In this case, the presence of clinical findings, seizure attack, autopsy evidence of massive cerebral oedema and focal haemorrhages in the brain with histological evidence of cerebral oedema, occlusion of the cerebral vessels with parasitized RBC containing pigments and finding of pigment within the brain tissue outside the blood vessels were supportive of cerebral malaria.

In the absence of a vaccine, the quick and accurate diagnosis of malaria, early treatment and proper management are the only effective ways of controlling mortality due to *P. falciparum*¹⁰. This death could have been prevented, if the disease was suspected and treatment was commenced at the initial stage. This case was reported to the inquirer into sudden deaths as a potential case of medical negligence. Therefore, it is important to consider malaria on a possible cause of death in sudden unexpected death in adults.

REFERENCES

1. Abeyasinghe RR, Galappaththy GN, Smith Gueye C, Kahn JG, Feachem RG. Malaria control and elimination in Sri Lanka: documenting progress and success factors in a conflict setting. *PLoS One*. 2012;7(8):e43162. doi: 10.1371 / journal.pone.0043162. Epub (accessed 28.12.2013)
2. Gay F, Zougbedé S, N'dilimabaka N, Rebollo A, Mazier D, Moreno A. Cerebral malaria: what is known and what is on research. *Rev Neurol (Paris)*. 2012;Mar;168(3):239-56.
3. DiMaio VJ, DiMaio D. blunt trauma injuries of the trunk and extremities, spleen. *Forensic Pathology*, 2nd Ed, Boca Raton, Florida: CRC press, 2001:135
4. WHO malaria action programme, Severe and Complicated Malaria. *Trans R Soc Trop Med Hyg* 1986;80 Suppl:3-50
5. Wyler D J: *Plasmodium Species (Malaria)*. In: Mandell GL, Douglas RG, Bennett JE, eds. *Principles and Practice of Infectious Diseases*. New York: Churchill Livingstone, 1990:2056-66
6. Schmutzhard E. Cerebral malaria: clinical features and diagnosis. *The African Journal of Neurological Sciences*, 1998;Vol 17 No.1
7. Curren R, Jones EL. *Gross pathology*, Harvey miller:Oxford University Press, 1974:78
8. Cortran RS, Kumar V, Robbins SL, Robbins pathologic basis of disease, 5th Ed, USA: WB Saunders company, 1994:363
9. Curren RC. *Colour atlas of histopathology*, 3rd Ed, Harvey miller publishers, New York: oxford university press, 1995:155
10. Kalinowska-Nowak A, Bociaga-Jasik M, Leśniak M, Mach T, Garlicki A. The risk of malaria during travel, observations in the department of infectious diseases in Cracow from 1996 to 2010, *Przegl Epidemiol*. 2012;66(3):431-6.

ANALYSIS OF THE DOMESTIC LEGAL FRAMEWORK IN RELATION TO THE RIGHT TO HEALTH FOR INTERNALLY DISPLACED PERSONS IN SRI LANKA

Wickramage Kolitha¹ and Senavirathne Wasantha²

¹ Head, Health Programs, International Organization for Migration, Sri Lanka.

² Senior Lecturer, Faculty of Law and Faculty of Graduate Studies, University of Colombo, Sri Lanka.

ABSTRACT

We critically examine Sri Lanka's current legal framework to examine the extent to which the 'right to health' is stipulated specifically for those conflict affected internally displaced persons (IDPs) living within IDP camp settings. Understanding the domestic legal frameworks pertaining to the right to health may be useful for those professionals working at the nexus of legal medicine and human rights in Sri Lanka and advancing gaps in knowledge in this area.

INTRODUCTION

Human Rights as they relate to the Right to Health

A "*human rights-based approach*" recognizes that every human being, by virtue of his or her birth as a human being, is a holder of rights. Human rights are therefore an obligation on the part of the *Government* to respect, protect and fulfill these rights. The United Nations supports its Member States in *progressively realizing* the right to health for all is thus a legal and moral obligation incumbent on all members of the international community. Today, the right to the enjoyment of the highest attainable standard of physical and mental health is at the centre of the achievement of the Millennium Development Goals (MDGs) - a major effort by global community to eradicate extreme poverty. Goals 4, 5 and 6 specifically relate to health. The human right to health is firmly recognized in numerous international instruments under the Normative Framework. For instance, Article 25(1) of the Universal

declaration of human rights (UDHR) while non-binding affirms, "everyone has a right to a standard of living adequate for the health of himself and his family, including food, clothing, housing, and medical care and necessary social services."

The ICESCR provides the most comprehensive article on the right to health in international human rights law. According to article 12(1) of the Covenant, States Parties recognize "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health", while article 12(2) enumerates, by way of illustration, a number of "steps to be taken by the States Parties to achieve the full realization of this right". ICESCR has been ratified by 145 countries, including Sri Lanka (as of May 2002). In May 2000, the Committee on Economic, Social and Cultural Rights, which monitors the Covenant, adopted a General Comment on the right to health. General Comments serve to clarify the nature and content of individual rights and States Parties' (those states that have ratified) obligations. The General Comment recognized that the right to health is closely related to and dependent upon the realization of other human rights, including the right to food, housing, work, education, participation, the enjoyment of the benefits of scientific progress and its applications, life, non-discrimination, equality, the prohibition against torture, privacy, access to information and the freedoms of association, assembly and movement. Further, the Committee interpreted the right to health as an inclusive right extending not only to timely and appropriate health care but also to the underlying determinants of health, such as access to safe and potable water and adequate

sanitation, an adequate supply of safe food, nutrition and housing, healthy occupational and environmental conditions and access to health-related education and information, including on sexual and reproductive health.

General Comment 14 acknowledges the importance of the underlying determinants of health by stating that the right to health is dependent on, and contributes to, the realization of many other human rights, such as the rights to an adequate standard of living, privacy and access to information. General Comment 14, contains both *freedoms* and *entitlements*. Freedoms include the right to be free from non-consensual medical treatment (this has especially been invoked on interventional studies and psychiatric treatments), torture and other cruel, inhuman or degrading treatment or punishment, and the right to control one's body, including sexual and reproductive freedom.

Entitlements include the right to a system of health protection; the right to prevention, treatment and control of diseases; the right to healthy natural and workplace environments; and the right to health facilities, goods and services. Participation of the population in health-related decision-making at the national and community levels is another important entitlement. Non-discrimination and equality are critical components of the right to health. States have an obligation to prohibit discrimination and ensure equality to all in relation to access to health care and the underlying determinants of health. States must recognize and provide for the differences and specific needs of population groups, such as women, children, or persons with disabilities, which generally face particular health challenges, such as higher mortality rates or vulnerability to specific diseases. General Comment 14 sets out four criteria by which to evaluate the right to health: a) *Availability* to allow functioning public health and health facilities, goods and services, as well as programmes, have to be available in sufficient quantity; b) *Accessibility* of Health facilities, goods and services have to be accessible to everyone without discrimination, within the jurisdiction of the State party; c) *Acceptability* of all health facilities, goods and services must be respectful of medical ethics and culturally

appropriate, sensitive to gender and life-cycle requirements, as well as being designed to respect confidentiality and improve the health status of those concerned; and, d) *Quality of Health* facilities, goods and services must be scientifically and medically appropriate and of good quality.

The right to health is a fundamental human right, yet there is opportunity for States to limit their responsibilities to exercise public health protection. The Covenant's limitation clause, article 4, is primarily intended to protect the rights of individuals rather than to permit the imposition of limitations by States. A State party for example can "*restrict the movement of, or incarcerates, persons with transmissible diseases such as HIV/AIDS, refuses to allow doctors to treat persons believed to be opposed to a government, or fails to provide immunization against the community's major infectious diseases, on grounds such as national security or the preservation of public order*", has the burden of justifying such serious measures in relation to each of the elements identified in article 4. As elaborated in article 5.1, such limitations by a State must be *proportional*. Proportionality means that measures must be least restrictive with alternatives adopted, they should be of limited duration and subject to review by UN Human Rights Council.

Additionally, the right to health is recognized, inter alia, in the CERD of 1963, the CEDAW of 1979 and in the CRC of 1989. Several regional human rights instruments also recognize the right to health, such as the European Social Charter of 1961 as revised, the African Charter on Human and Peoples' Rights of 1981 and the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights of 1988 (the Protocol entered into force in 1999). Similarly, the right to health has been proclaimed by the Commission on Human Rights and further elaborated in the Vienna Declaration and Programme of Action of 1993 and other international instruments.

New trends and developments in international legal framework pertaining to health and human rights

In recent years, there have been considerable developments in international law with respect to the normative definition of the right to health, which includes both health care and healthy conditions (Yamin, 2005). These norms offer a framework that shifts the analysis of issues such as disparities in treatment from questions of quality of care to matters of social justice. When assessing the new additions to the international legal framework, there appears to be a trend towards a more inclusive definition of the right to health for specific segments of the population, most notably children and disabled persons, and within specific contexts.

For instance, The Convention on the Rights of the Child was adopted and opened for signature, ratification and accession by General Assembly resolution 44/25 of 20 November 1989. It entered into force 2 September 1990, in accordance with article 49. The Children's Convention have some powerful provisions regarding child health, yet to help stem the growing abuse and exploitation of children worldwide, in 2000 the United Nations General Assembly adopted two Optional Protocols to the Convention to increase the protection of children from involvement in armed conflicts and from sexual exploitation. First was the Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography, adopted and opened for signature, ratification and accession by General Assembly resolution A/RES/54/263 of 25 May 2000, entry into force on 18 January 2002. Second was the Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict, adopted and opened for signature, ratification and accession by General Assembly resolution A/RES/54/263 of 25 May 2000, entry into force 12 February 2002. The fact that special emphasis was provided to child wellbeing in conflict settings is indicative of a trend towards context specific and focus on specific vulnerable groups in the population.

More recently, the United Nations passed a resolution protecting the rights of disabled

persons that is also indicative of the trend in focusing on specific vulnerable groups and recognizing the unique health, developmental and economic challenges these groups face in society. The Convention on the Rights of Persons with Disabilities is an international human rights treaty of the United Nations intended to protect the rights and dignity of persons with disabilities. The Convention which opened for signature on 30 March 2007 became one of the most quickly supported human rights instrument in history, with strong support from all regional groups. 155 States signed the Convention upon its opening in 2007 and 126 States ratified the Convention within its first five years (UN, 2012). Article 25 provides explicit protection on health grounds specifying that "persons with disabilities have the right to the enjoyment of the highest attainable standard of health without discrimination on the basis of disability", with "States Parties shall take all appropriate measures to ensure access for persons with disabilities to health services that are gender-sensitive, including health-related rehabilitation. Highly relevant to the research question posed in this thesis, was the emphasis the 2007 Convention placed on rights of disabled persons in situations of humanitarian emergencies. Article 11 of the convention on 'Situations of risk and humanitarian emergencies' stipulates that States Parties shall take, in accordance with their obligations under international law, including international humanitarian law and international human rights law, all necessary measures to "ensure the protection and safety of persons with disabilities in situations of risk, including situations of armed conflict, humanitarian emergencies and the occurrence of natural disasters".

The review of international frameworks in this chapter have also revealed potential weaknesses in enabling health protection of civilians affected by conflict – that of the role of health professionals. In times of armed conflict and in post-conflict situations, civilian hospitals, medical facilities and health and medical staff may themselves become targets of war. Ensuring health protection requires steps not only to safeguard the lives of health workers involved in responding to humanitarian crises,

but also ensuring the enabling environment is created for them to practice effectively. Essential to the human rights perspective of health are the obligations of the State and non-state actors in protecting the health care workers/health system in order to ensure the fulfillment of the individual's right to health. Health protection can also be enabled if the professionals responsible for the health care system are well trained, capacitated and committed to universal ethical principles and professional standards. The state is therefore responsible to establish and secure an enabling environment for health professionals to undertake interventions.

Indeed in 2002 the UN Member States at the 55th World Health Assembly in Geneva adopted a resolution WHA55 entitled "Health and medical services in times of armed conflict" (WHA, 2002), to protect medical missions and to enforce the protection of healthcare during conflict settings. Whilst the resolution was recognized as supportive of the Geneva Conventions to enforce the protection of healthcare during armed conflict, many human rights organizations and advocates called for the leadership by WHO to develop practical methods and mechanisms for the documentation of all violations of international humanitarian law against patients, health workers, facilities, and transports and to provide guidance to member States in how to increase protection of health functions in zones of armed conflict. Indeed a coalition called "Safeguarding Health in Conflict Coalition" formed by aid organizations such as Doctors for Human Rights, International Council of Nurses and Physicians for Human Rights and other, advocated to WHO to urge passage of a new resolution—requiring the WHO to lead international data-collection of attacks on health workers, facilities, transports, and patients (Intra-health, 2012). At the 65th World Health Assembly in Geneva in May 2012, WHO member states adopted a resolution requiring the WHO to lead international data collection on attacks involving health workers, facilities, transportation and patients during armed conflicts (WHA, 2012). The Safeguarding Health in Conflict coalition also appealed to WHO to ensure there is domestic and international prosecution of those responsible

for intentional attacks on healthcare facilities, health workers, patients and the transport systems for providing drugs and medical supplies, which constitute war crimes under the laws of war (IHPI, 2012). This latter proposal however has yet to be adopted, with robust systems of accountability, with consequences for non-compliance of the resolutions still not enshrined by member states (Rubenstein, 2012).

The emergence of global epidemics such as SARS in 2003 and the implications of multinational corporations in influencing the health of populations such as the Tobacco and Pharmaceutical industries, have highlighted the urgent need to reform national public health laws and international obligations relating to public health in order to meet the new realities of a globalized world (Sohn, 2012). For instance, the WHO Framework Convention on Tobacco Control (2003) was a direct response to the need to ensure the right to health of all populations at risk of cancer and other morbidities due to cigarette smoke, and the revision of the WHO International Health Regulations in 2005 which provides a legal basis for the control and prevention of communicable diseases. Although discussions on such developments go beyond the scope of this thesis focused on a post-war health sector humanitarian response, such trends are expected to lead to enhancements within the existing international human rights instruments/policy landscape.

In this analysis of normative frameworks, it also becomes apparent that there are complex linkages between health and human rights (WHO, 2002). The right to health is inter-related with, and expressed implicitly and explicitly in numerous articles. To speak of health in isolation of other rights then becomes futile. These inter-relationships, graphically presented in Figure 1, show the protection of specific rights of IDPs during disasters and their connection with the normative frameworks. Therefore the right to health operates directly or indirectly as a prerequisite to all other human rights recognized in treaties. To deny someone health care is to deny or damage all that individual's rights. Without health, individuals are denied their right to be contributing members of the community and

to provide for their families. Individuals who lack adequate health care can thus lose some or all ability to exercise fully the civil, political, economic, social, and cultural rights they possess. As Perrin in his analysis of *The Right to Health in Armed Conflict* articulates, the protection of the right to health requires the complement of the entire legal framework; “While IHL integrates specific considerations, striking a balance between humanitarian considerations and military necessity, human rights law remains relevant to complement IHL in order to fill the potential gaps” (Perrin, 2009).

Finally, the SPHERE Standards were presented as an important and practical resource/tool to guide Governments and humanitarian actors to ensure the Right to Health is realized for disaster affected populations. However, it is important to point out that the SPHERE standards reflect the minimum standards and package of essential life saving care. What should aimed for is not the minimum, rather to achieve the realization of the entire complement of care afforded to other non-displaced members of the society.

The rights of internally displaced persons

All persons are entitled to enjoy, equally and without discrimination, the same rights and freedoms under international and national law. There are various bodies of International law that provide a comprehensive International legal framework for protection in all situations, including those during armed conflict. However, there are three bodies of law that provide a legal framework for protection in all situations of internal displacement: International human rights law (IHR), International humanitarian law (IHL), and finally International criminal law (ICL). A fourth element is also considered: “The Guiding Principles on Internal Displacement” (GPID). While the GPID is not a law, it sets out the rights of IDPs and the responsibilities of States and other authorities towards them. Other internationally developed instruments, guides and standard operational principals and articulate the right to health for displaced populations. These include the SPHERE Project which sets a Humanitarian Charter and

Minimum Standards in humanitarian intervention, and Codes of Conduct enshrined in individual agencies such as those International Red Cross & Red Crescent Movement.

Duty to Protect in reference to Internally Displaced Persons (IDPs)

Internally Displaced Persons (IDP) are defined as persons who are uprooted for reasons of war, disaster or persecution, and move within the borders of their own nations¹. During the three decades of armed conflict between the Sri Lankan armed forces and the Liberation Tigers of Tamil Eelam (LTTE), it is estimated that over a million people were displaced. As of the end of September 2012, more than 115,000 internally displaced people (IDPs) were still living in camps, with host communities or in transit sites, or had been relocated to areas other than their places of origin in Sri Lanka².

Refugees, by definition, are outside of their country of nationality or habitual residence¹. Both categories of displaced persons often face similar risks and deprivations. Unlike IDPs however, refugees have a legal status under international law. IDPs are primarily the responsibility of the state and come under the purview of state law. This has resulted in many debates being raised as to the level of international community’s involvement in IDP crisis. IDPs depend on the state for protection and assistance. IDPs’ fundamental rights and freedoms and economic and political freedoms are often compromised. Therefore the protection needs and risks of this sector are generally higher than those of the general population. Involuntary departure and the fact that the individual remains within his/her country are the two defining elements of an internally displaced person (IDP).

¹ A refugee is defined as a person who owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his/her nationality or habitual residence, and is unable, or owing to such fear, is unwilling to avail himself/herself of the protection of that country. See Art. 1 of the 1951 Convention Relating to the Status of Refugees.

Figure 1 adapted from the WHO, shows the required multi-sectoral approach for protecting the health rights of IDPs (Bile et al., 2011). As summarized in Figure 1, the right to health for IDPs, lie at the fulcrum of the right to life, economic, social and cultural rights and civil

and political rights. It therefore highlights internal displacement as a core human rights problem, and not merely a humanitarian issue that requires humanitarian response. Internal displacement violates civil and political as well as economic, social and cultural rights.

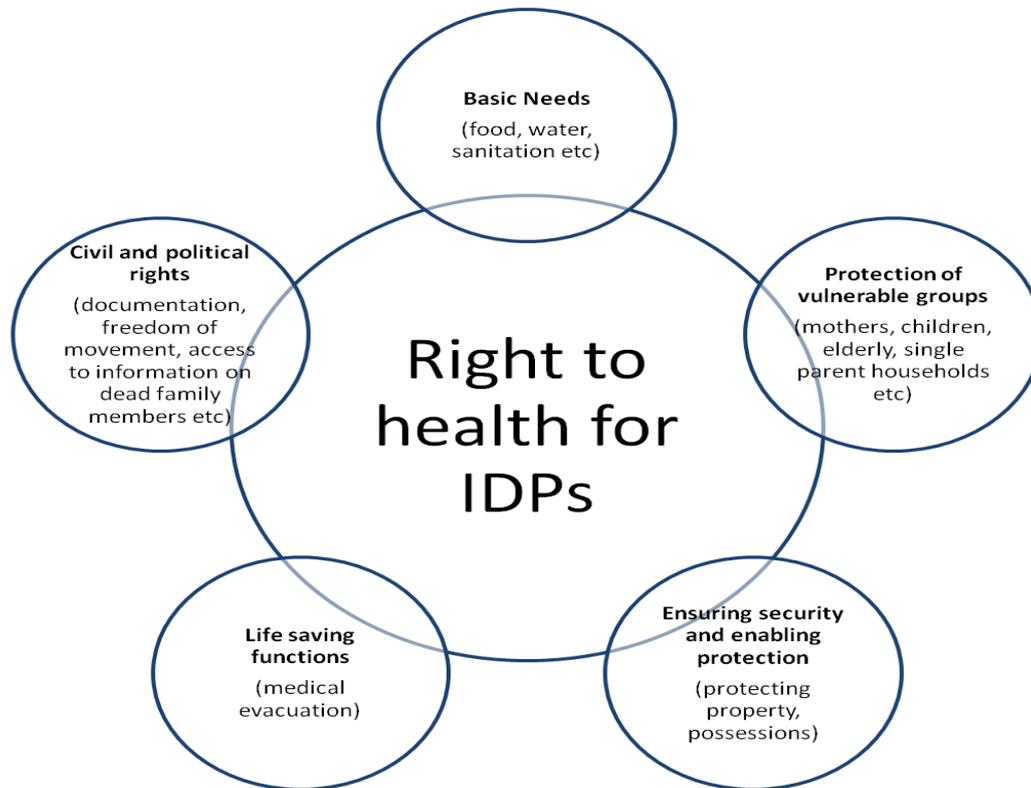


Figure 1 - Protection of specific human right during disasters and their connection with health rights

Each State bears the primary responsibility for protecting internally displaced persons, and all persons within their own country. National responsibility is a core concept of any response to internal displacement. The role of the international community cannot directly affect the protection of IDPs since IDPs are a function of state sovereignty. Even as governments themselves may act as perpetrators of violence, and human rights violations against their own citizens, the role of international actors is to reinforce, not replace, national responsibilityⁱⁱ. The State must not only ensure the protection of rights in accordance with international law, but responsibly enable indigenous strategies and domestic legal protections in situations of

internal displacement. The international strategic framework entitled *Addressing Internal Displacement - Framework for National Responsibility* sets 12 key actions for states to implement in relation to IDP protection³. Today it forms a sort of ‘checklist’ for protection of IDPs and gauge responses by the State. In addition to entailed is contained in the 12 elements. This framework will be applied in later chapters as an attempt to determine the extent to which the Sri Lanka authorities ensure the right to health for those Internally Displaced in the aftermath of the most recent civil conflict.

Domestic Legal Framework in Sri Lanka

The Government of Sri Lanka (GoSL), with its dualist system of law making has a responsibility to ensure that their national laws and policies respect and reflect their obligations

ⁱⁱ In situations of armed conflict, both State and non-State actors, have a responsibility to respect and ensure respect for international humanitarian law, including by providing protection and assistance to the civilian population.

under international law, including those contained in international human rights and humanitarian law. More specifically, national legislative and policy frameworks should respect the rights and guarantees to which IDPs are entitled under international law, and be consistent with Sri Lanka's international legal obligations. IDP Protection strategies and activities should also take into account relevant domestic traditional, customary, or religious dispute resolution mechanisms.

While the local laws are applicable to IDPs, the analysis below provides evidence that there is no policy coherence, and in some cases, 'non-progressives' in legislation to address the right to health of the displaced. Further, there is no overarching national legal framework that specifically and holistically refers to right to health for those internally displaced. The result of this is that IDPs may be deprived of their rights and marginalized of their agency and aspiration. Thus, in Sri Lanka, existing health provisions applicable to IDPs are scattered in an unsystematic manner, with little cohesion. Nonetheless, the rights of IDPs are partially secured by approximately 11 existing national laws/acts described in detail below. Of these, the vast majority were created between 2002 and 2007.

Though the *Right to Health* it is not directly stipulated as a Constitutional right, there are instruments in Sri Lankan fundamental rights field that may be evoked. According to the *Article 12 (1)* of Constitution, "all persons are equal before the law and are entitled to the equal protection of the law. Therefore, special mechanisms, if the situation requires should be provided to uplift their rights because different qualities of health standards for persons residing in different geographic locations may constitute discrimination under the Article 12 of Sri Lankan Constitution. Common laws that apply to all states citizens are also invoked in protecting IDP rights. Statutes like Penal Code, Food Act, Health Service Act and provincial statues on health service have specifically laid down provisions to maintain and preserve public health. IDPs too, are entitled to these constitutional and statutory rights, with no distinctions to their status as IDPs. The discussion below analyses the domestic legal

framework in ensuring the right to health of internally displaced persons in Sri Lanka.

The Sri Lankan Constitution

The Fundamental Rights Chapter 3 of the Sri Lankan Constitutionⁱⁱⁱ does *not* explicitly express and recognize the right to health. As described earlier, the only reference given to health is as a suspension or derogation where Article 7 of the Fundamental Rights of the constitution states, "*in the interests of national security, public order and the protection of public health...*" the state may withhold rights. The Sri Lankan Constitution guarantees that "(1) *All persons are equal before the law and are entitled to the equal protection of the law*", and, (2) "*No citizen shall be discriminated against on the grounds of race, religion, language, caste, sex, political opinion, place of birth or any such grounds*".

Even though there is no explicit statement in the Constitution of Sri Lanka on the *right to health*, the constitution does clearly articulate the *right to life* in Articles 11 and 13.4 of the constitution. This inalienable right of life is indeed a pragmatic link to the right to health since there is no life without health. Therefore it may also be argued that the right to health is protected under the Sri Lankan Constitution because the right to life would be meaningless without it.

A prime example where the *right to life* clause has enabled the *right to health* is seen by the landmark decision of Justice Mark Fernando made in the Supreme Court in the case of Sanjeewa, AAL (on behalf of G.M.Perera) V Suraweera, OIC, Wattala and others, where he cited the Article 12 of the ICESCR^{iv}. The bench ruled in this case that "citizens have the right to choose between state and private medical care to save one torture victim's life". Justice Mark Fernando submitted that the infringement of a right to health can be justifiable under the Sri

ⁱⁱⁱ A constitutional right is a legal right granted by a sovereignty's constitution to its citizens and possibly others within its jurisdiction.

^{iv} *Silva v Iddamaligoda* 2003 2 SLR 63, *Rani Fernando v OIC Seeduwa Police*, SC/FR/700/2000, SCMinutes 26.07.2004 and described in paper by Dissanayake, S (2009) "Right to Health" of Internally Displaced Persons, Human Rights Commission of Sri Lanka.

Lankan Constitution because the right to life would be meaningless without providing essential health care¹⁷.

An interesting comparison can be made with the constitution of Mozambique, another country, like Sri Lanka, that was subjected to a protracted civil crisis which led to millions of internally displaced persons. In Mozambique's Constitution, the articulation and enshrinement of the *right to health* within the Fundamental Rights, Duties And Freedoms of the Constitution, provides that "all citizens shall have the right to medical and health care, within the terms of the law, and shall have the duty to promote and preserve health"⁴. The Constitution clearly states that "medical and health care for citizens shall be organized through a national health service which shall benefit all Mozambicans". Thus the right to health is explicitly expressed within its constitution for citizens.

The *Right to health* is given a statutory recognition in numerous *Statutory Rights*^v in Sri Lanka. The 13th Amendment of Sri Lanka's Constitution (Certified on 14th November, 1987) devolves major elements of health care to Provincial and District level Government authorities, to especially promote more efficient administration by the local Authorities in relation to public health. As per the List I (Provincial Council List of 9th Schedule) referred in Article 154A of 13th Amendment to the Constitution, "the establishment and maintenance of public hospitals, rural hospitals, maternity homes, dispensaries (other than teaching hospitals and hospitals established for special purposes); *Public health services, health education, nutrition, family health, maternity and child care, food and food sanitation, environmental health and Formulation and implementation of Health Development Plan and of the Annual Health Plan for the Province come under the purview of relevant Provincial councils. According to the Concurrent List (List III referred 13th Amendment of the Constitution), schools for training of Auxiliary Medical Personnel; the supervision of private medical care, control of*

^v Statutory rights are an individual's legal rights, given to him or her by the local and national ruling government.

nursing homes and of diagnostic facilities within a Province; Population control and family planning and Constitution of Provincial Medical Boards are to be done by both parties". Other Subjects and Functions not Specified in List I or List III are reserved by the Central Government. These include such components as financial allocation of health budgets.

The Sri Lankan Penal code

Sri Lanka's criminal code is a document which compiles all, or a significant amount of, a particular jurisdiction's criminal law⁵ Typically a criminal code will contain offences which are recognized in the jurisdiction, penalties which might be imposed for these offences and some general provisions (such as definitions and prohibitions on retroactive prosecution. In Sri Lanka's Penal code 3 sections cite offences affecting the public health: *Section 271. Making atmosphere noxious to health, Section 262. Negligent act likely to spread injection of any disease dangerous to life and Section 263. Malicious act likely to spread infection of any disease dangerous to life.*

These sections make it punishable "*to do a negligent or malicious act likely to spread infection of any disease dangerous to life*". In addition, adulteration of foods, making atmosphere noxious to health, fouling the water of a public spring or reservoir, inter alia are made as offences under the Penal Code and also under the Food Act. Commentators have concluded that according to these provisions, "no doubt exists" as to the recognition of the statutory right regarding right to health⁶.

Sri Lanka's Emergency Laws and implications for public health protection

The Sri Lanka Penal Code does contain many provisions where the state can charge and prosecute individuals who are considered "*enemies of the state and terrorists*". Two additional sets of laws—the *Public Security Ordinance 1947 (PSO)*, dating back to British colonial rule⁷, and the *Prevention of Terrorism (Temporary Provisions) Act of 1979 (PTA)*—provides the state broad powers to hold individuals without charge or trial in violation

of their basic due process rights⁸. The Prevention of Terrorism Act, enacted in 1979, allows arrests without warrant and permits detention without the suspect being produced before a court for up to 18 months.

The government formulated more than 20 new emergency regulations in 2005, following the assassination of the then Foreign Minister, Lakshman Kadirgamar. Two important emergency laws formulated in 2005 were: *The Emergency (Miscellaneous Provisions and Powers) Regulation No. 1 of 2005* and the *Emergency (Prevention and Prohibition of Terrorism and Specified Terrorist Activities) Regulation No. 7 of 2006*, provide military personnel with sweeping powers of arrest and detention without regard to the fundamental rights protections provided by international law. The key features/powers to state activated by these two emergency laws may also allow for the detention of any person “acting in any manner prejudicial to the national security or to the maintenance of public order, or to the maintenance of essential services”. The State may: a) Allow for detention of persons without charge for up to one year. This can be extended for an additional six months, or 18 months altogether. The Emergency Regulations provide for a detainee to be physically produced before a magistrate within 30 days (instead of within one day (24 hours) under the criminal procedure code); or b), Authorities need *not* submit a written record of arrest and detention to the court, or ensure the rights of detainees to be notified of the reasons for arrest or for detainees to have access to legal counsel^{vi}.

It is important to highlight in this discourse on *health and human rights* that the IDP camps were not managed under civilian administration (through the Government agent), rather by the Ministry of Defense (under the purview of a military officer titled “Competent Authority of IDP care”). Health care services within the IDP camps were however managed by the Ministry of Health under the guidance of the Minister of Health, Secretary of Health and under field operational leadership of Directorate of IDP Health Care. The competent authority for IDPs

^{vi} Showing that important requirements of Sri Lankan law are not applicable under the emergency regulations.

restricted movement of displaced persons out of Menic Farm IDP camp during the first 6 months, permitting only those deemed severely ill requiring referral to specialized medical facilities, or those who had obtained special consent from authority to depart camp. Both international and local humanitarian agencies were also initially subjected to restricted movement/access into the IDP settings, although access to undertake interventions were granted to UN agencies and increased within 2 to 3 months of camp establishment. The rationale provided for such measures were that tight enforcement of camp movements were needed until LTTE cadres from within the displaced civilian population were identified and referred for Government rehabilitation and reintegration programs⁹. Emergency laws of Sri Lanka were invoked via parliamentary process, and other anti-terrorism legislation as ground for the state to undertake measures to isolate those ‘enemies of the state’. The restrictions on civilian movements in and out of Menic Farm were lifted after this phase. Some advocacy groups termed such restrictions, to both humanitarian access and movement of IDPs’ as ‘unlawful’¹⁰.

The Sri Lanka Penal Code contains many provisions where the state may indeed charge and prosecute individuals who are considered “*enemies of the state and terrorists*”. The Prevention of Terrorism Act (PTA), enacted in 1979, allows arrests without warrant and permits detention without the suspect being produced before a court for up to 18 months. The government may hold a person under the PTA on suspicion and need not charge the person with an offense. The government formulated more than 20 new emergency regulations in 2005, following the assignment of Foreign Minister Lakshman Kadirgamar. Two important emergency laws formulated in 2005 were: *The Emergency (Miscellaneous Provisions and Powers) Regulation No. 1 of 2005* and the *Emergency (Prevention and Prohibition of Terrorism and Specified Terrorist Activities) Regulation No. 7 of 2006*, provide military personnel with sweeping powers of search, arrest, and detention without regard to the fundamental rights protections provided by international law. Authorities need *not* submit a written record of arrest and

detention to the court, or ensure the rights of detainees to be notified of the reasons for arrest or for detainees to have access to legal counsel. According to Human Rights Watch Report (HRW) of Sri Lanka in 2010¹⁰, the emergency regulations of Sri Lanka are “*vaguely worded*” and claim to facilitate arbitrary arrest of suspects. Habeas corpus is a writ requiring a person under arrest to be brought before a judge or into court, especially to secure the person’s release unless lawful grounds are shown for their detention¹¹. Habeas corpus is an important aspect of human rights, and article 141 of the Sri Lankan constitution, provides for the right of habeas corpus¹². The HRW alleges that Sri Lanka Emergency Regulations violates article 141 of constitutional rights by allowing authorities to hold detainees in irregular places of detention, move a detainee from place to place for interrogation, and do not require the publication of a list of authorized places of detention¹³. The HRW report argues that the term “prejudicial to the national security” is not further defined and “could be interpreted to include peaceful or nonviolent acts protected under the rights to free expression or association”.

In discussing the *Right to Health* as a Universal Human Right Norm, it becomes important to expand on the key international instruments and how they enshrine the right to health. International human rights law provides protections to individuals in custody during an internal armed conflict unless they are superseded by more specific provisions of humanitarian law. International humanitarian law (*the laws of war*) exists as *international humanitarian law* and *human rights law*, and are applicable during internal armed conflicts such as the conflict in Sri Lanka. Importantly, *international human rights laws* includes the International Covenant on Civil and political Rights (ICCPR)¹⁴, which Sri Lanka ratified in 1980, and the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment¹⁵, the Convention on the Rights of the Child¹⁶, and other sources of human rights law. Human rights can only be suspended in certain circumstances, such as during a declared state of emergency, where the State may temporarily derogate from (suspend) certain rights. Such suspension is subject to

strict requirements outlined in the *Siracusa Principals*. The ICCPR also permits states to suspend or restrict (derogation) certain rights during a state of emergency. There are however, a number of human rights that cannot be restricted in any circumstance including *the right to life, as freedom from torture and slavery and freedom of thought, conscience and religion*.

A UN report alleged serious human rights violations against the Government of Sri Lanka (labeled in media as the *Darusman Report*) and also in recent UNHRC debates on Sri Lanka, that the Sri Lankan government violated the fundamental human rights, including the right to be informed of specific reasons for arrest, the right to challenge the lawfulness of the detention before an independent judicial authority (habeas corpus), and the right of access to family members while the displaced population lived in Vavuniya IDP camps¹⁷. The Government of Sri Lanka maintained that the final assault on the LTTE in the Wannu region from early 2009 was based on ‘humanitarian grounds’. The Government military spokespersons and the political leadership labeled the final conflict as a ‘*rescue mission*’ to ensure *the protection of rights* of those innocent civilians incarcerated by the LTTE”. The State embraced the view that the assault was part of an *obligation to protect civilian life and respect and fulfill the right to health*, within their jurisdictions.

Acts, policies and legislation relevant to upholding the right to health of IDPs in Sri Lanka

a) Rehabilitation of Persons, Properties and Industries Authority Act, No. 29 of 1987- was drafted “to assist the owner of any affected property to repair and restore such property. Under the Act, the Government of Sri Lanka (GoSL) upholds the responsibility of creating an authority to assist in the repair, restoration, or rehabilitation of persons, properties industries. This act derives some elements from the Principles on Housing and Property Restitution for Refugees and Displaced Persons (*Pinheiro Principles*).

b) Welfare Benefits Act, No. 24 of 2002 - provides the necessary legal framework for the payment of welfare relief benefits and formulates the guidelines for a transparent selection process for welfare recipients.

c) Mediation (Special Categories of Disputes) Act, No. 21 of 2003 - this Act dictates the creation of arbitration boards for special categories of disputes, including those that relate to resettlement. Although most special categories are not clearly defined in the act, the authority created in the process upholds the responsibility of identifying and defining these special circumstances.

d) Sri Lanka Disaster Management Act, No. 13 of 2005 - called for the establishment of the National Council for Disaster Management, the Disaster Management Centre, and technical advisory committees, amongst other entities. These entities are responsible for the preparation, coordination, and management of disaster-related plans and programs.

e) The Tsunami (Special Provision) Act, No. 16 of 2005 and Registration of Deaths (Temporary Provision) Act, No. 17 of 2005 - served in the pressing aftermath of the 2004 tsunami to address temporary and immediate coordination and distribution channels for humanitarian aid and relief.

f) The Geneva Conventions Act, No. 04 of 2006 - gives “effect to the first, second, third, and fourth Geneva Conventions on Armed Conflict and Humanitarian Law¹⁹. Adherence to the obligations under the Geneva Conventions has a bearing on the status of Sri Lanka’s IDPs, and the government is obligated under International Humanitarian Law in protecting the rights of civilians during times of war.

g) National Child Protection Authority Act, No 50 of 1998 - Recommends measures to address the humanitarian concerns relating to children affected by armed conflict and the protection of such children, including measures for their mental and physical wellbeing and their reintegration into society. A related, yet thematically different act is the Children and Young Persons Ordinance Act, which describes the age of legally entering workforce and

conditions for child labour. It derives its formulate from the ILO convention with reference to child labour etc. ILO convention talks about the age of 14 years as the child labour age, and 14 to 18 is allowed but for ‘non harmful jobs’ which do not significantly impact on physical and mental development.

h) Mental Health Policy of Sri Lanka (2005), and the Mental Health Act of Sri Lanka, 2010 (currently submitted for Cabinet approval). The National Mental Health policy applies latest advances in mental health care and treatment, and reshaping more power to patients and for community based rather than institutional care. Whilst it does not explicitly mention IDPs, it acknowledges the fact that after protracted civil conflict, the need for community mental health services are even more pronounced. The policy principles articulate, the protection of ‘the human rights and dignity of people with mental illness’ and for ensuring ‘mental health services will be culturally appropriate and evidence based’.

i) Resettlement Authority Act, No. 09 of 2007- decrees the “Establishment of an authority to be called the Resettlement Authority; to vest the Authority with the power to formulate a national policy and to plan, implement, monitor, and co-ordinate the resettlement of the internally displaced persons and refugees¹⁹. The Resettlement Authority Act has functions to ensure that resettlement or relocation of IDPs in a safe and dignified; and that IDPs are engaged in the development process of the country. The Act is limited in its protection of more recent IDP case loads, since it articulates the protection of those protracted IDPs (from 1983 to the 2006), and not the ones most recently displaced. The Act is also not intended to provide provisions for resettlement, rather ‘to coordinate activities’ of IDPs.

j) International Covenant on Civil and Political Rights Act of Sri Lanka No. 56 OF 2007- Is perhaps the most powerful Act in term of guaranteeing rights of IDPs, although it does not explicitly mention IDPs. Its power lies in the fact that it allows for the High Court to exercise jurisdiction over the enforcement of the human rights recognized under this Act. There is no such clause even in the

Fundamental Rights chapter in the Sri Lankan Constitution. Technically, this Act provides leverage for securing rights for IDPs who are after all citizens of the State.

k) National Migration Health Policy of 2013 -

Provides emphasis on all forms of migrant and mobile populations, including those ‘forced migrants’ (as refugees and IDPs). The policy articulates an inter-ministry approach in ensuring the public health safety of the migrants, irrespective of irregular (undocumented) and regular status, and also ensure the public health of host population. The policy articulates a *rights-based* approach to health, and emphasizes State functions to ensure the right to health is fulfilled via health assessment, border health interventions and reintegration of returnee migrants by health system, to name a few dimensions.

l) National Action Plan for the Protection and Promotion of Human Rights (2011 to 2016) -

Internal displacement violates civil and political as well as economic, social and cultural rights. There is a need to highlight internal displacement as a core human rights problem. It is not only a humanitarian issue that requires humanitarian response. Indeed a positive development the Government of Sri Lanka has taken, which some critiques may say symbolically, has been the launch of a *National Action Plan for the Protection and Promotion of Human Rights (2011 to 2016)*. The plan was developed by a range of civil society, academic and government agencies between 2010 to 2011. The government strategy to improve the rights of IDPs has been further strengthened by the activities contained in the priority areas on IDPs articulated in a National Action Plan. The Ministry of Resettlement and the Ministry of Disaster Management are the main ‘focal’ departments are responsible for the implementation of the majority of recommendations for IDP rights, with support of the relevant line-ministries. While the Government of Sri Lanka has not chosen to adopt the GPID as a Government Policy for assisting IDPs affected by the conflict, it may be argued that the *National Action Plan for the Protection and Promotion of Human Rights* and other domestic policy instruments provide sufficient protections for IDPs by way of a

nationally accepted action plan, where if implemented, may contribute in realization of the right to health.

Other relevant instruments, protocols and groups

A positive step taken by the Ministry of Health within one year of displaced persons entering Menic farm was the establishment of *National Standard Operating Procedures and National Guidelines in Health Sector Disaster response*. The guidelines were developed by the DPRU, the same unit that coordinated the health sector efforts, after extensive consultation from medical colleges, academia, UN agencies and NGOs. The detailed guidance notes encompass all aspects of disaster response and is now delivered as a modular course to help capacitate medical officers as humanitarian health sector focal points throughout the country. However as indicated by the 55th and 65th World Health Assembly Resolutions in encouraging health care workers and health system to systematically measure violence related incidents through its various typologies (explained in previous chapter) is still not mandated in the Ministry of Health plans. Better training of public health workers in undertaking conflict sensitive and culturally appropriate strategies for violence prevention and mitigation may serve to boost the existing *National Standard Operating Procedures and National Guidelines in Health Sector Disaster response*.

Sri Lanka IDP Protection Working Group (IPWH)

In Sri Lanka, an IDP Protection Working Group (IPWH) was established by UNHCR in 2006 to serve as an Inter-Agency forum to bring actors together to discuss protection issues related to the conflict, IDPs and returnees at a national level. The Working Group aims to strengthen collaboration between agencies, identify needs and gaps, and advise the Government of Sri Lanka) and UN Country Team on protection issues. The IDP Protection Working Group has strong links with IDP protection fora in the districts and reports on a regular basis. The IDP Protection Working Group’s membership consists of both UN and non-UN actors²⁰. The

IDP Protection Working Group is chaired by UNHCR and reports periodically to the Inter Agency Standing Committee ('IASC') and Consortium of Humanitarian Agencies on protection issues. Despite the broad mandate of the IPWG, it is unclear how the group contributed to the humanitarian response that emerged following the resolution of military conflict in 2009. There is little documented evidence and references to the activities of the IPWG during this period.

SUMMARY

This paper aimed to provide a brief overview of the principles in relation to Right to Health for IDPs in Sri Lanka and how these are enshrined within domestic legal frameworks. To summarize, the right to health is enshrined under multiple policies and legal provisions. While the language varies across such documents, it is noted that three key concepts emerge across all international instruments: First, it is the State that has the responsibility to guarantee their citizens the right to adequate health. Secondly, the State has the responsibility to ensure that none of their citizens are deprived of this right by state action. Finally, these rights are guaranteed to all citizens, regardless of displacement status, race, religion, gender, age, or social standing in the community, or other status.

In this analysis of normative frameworks, it also becomes apparent that there are complex linkages between health and human rights (WHO, 2002). The right to health is inter-related with, and expressed implicitly and explicitly in numerous articles. To speak of health in isolation of other rights then becomes futile. These inter-relationships, as graphically presented in Figure 1, show the protection of specific rights of IDPs during disasters and their connection with the normative frameworks. Therefore the right to health operates directly or indirectly as a prerequisite to all other human rights recognized in treaties. To deny someone health care is to deny or damage all that individual's rights. Without health, individuals are denied their right to be contributing members of the community and to provide for their families. Individuals who lack adequate health care can thus lose some or

all ability to exercise fully the civil, political, economic, social, and cultural rights they possess. As Perrin in his analysis of *The Right to Health in Armed Conflict* articulates, the protection of the right to health requires the complement of the entire legal framework; "While IHL integrates specific considerations, striking a balance between humanitarian considerations and military necessity, human rights law remains relevant to complement IHL in order to fill the potential gaps" (Perrin, 2009).

Ensuring IDP health protection beyond acute phases

Many studies have shown that long after the 'last bullet is fired' from the barrel of a gun, the health consequences of war linger on. They linger not only in the buried landmines that result in blast injuries even decades after the peace-accords are signed, but as traumatic events buried within scarred minds, and at the most fundamental level of our genes. Solana (2006) argues that, 'when crises are being resolved long term health issues are addressed last. Public health policy is thus seldom thought of in human security terms'. Well into periods of lasting peace, the contaminants of war such as landmines and UXOs continue to kill and maim civilian populations. The constant displacement, both as internally displaced persons or as refugees fleeing the state boundaries, leads to disruptions in vaccination campaigns, micronutrient supplementation programs, and other public health efforts. The 'downstream' impact of such chronic nutritional deficiencies may also lead to abnormal child growth outcomes (Gluckman, 2007). Generational impacts can also be seen in children born to underweight mothers, where stunting (height-for-age) and poor cognitive function development may also occur. The "fetal programming hypothesis," also known as the "developmental origins of health and disease" suggests that conditions very early in human development, even *in utero*, can leave lasting imprints of an organism's physiology, imprints that may 'affect susceptibility to diseases' with onsets that may occur many decades later (Gluckman, 2007).

A seminal study by Susser and colleagues (1998) on the follow-up of children conceived during the Nazi occupation of Holland at the end of World War II implicated fetal stress to poor psychiatric outcomes later in adult life. Also called the “Dutch Hunger children study”, the research provided a natural experiment in which pregnant women, along with the rest of the civilian population, were subjected to extreme food deprivation during a relatively discrete period of conflict (Terry, 2001). There was clearly a statistically significant elevation of risk of schizophrenia and related disorders among those whose mothers went through the peak of the famine during their second trimester of pregnancy (Brown, 2000). These findings have also been validated in other studies of individuals born during times of hunger and famines in China (St Clair, 2005). The affect chronic stress has on reshaping the human genome has also been revealed in Nobel Prize winning research (Epel, 2004). Evidence suggests that prolonged psychological stress not only influences disease processes and cellular immunity but also affect molecules that play a key role in aging. The implications of these research findings to those war affected populations that have experienced significant chronic stress through protracted conflicts and multiple displacements are yet to be explored.

These findings bring new insights and challenges into the ‘ripple effect’ on human health, development and wellbeing long after the resolution of conflict. Therefore, even though the ‘right to health’ may be realized for those displaced during the period of their stay in IDP camps, the fact that there are longitudinal consequences pertaining to health protection is of significant value, and a one often overlooked by health authorities, aid health agencies and human rights activists. It is argued that health systems need to account for and addressing such effects in health policy and planning following a humanitarian crisis.

From this analysis of the domestic legal framework that Sri Lanka has a somewhat robust and well articulated means of ensuring protection of those displaced. There appears to be sufficient provision for the fulfillment for the rights to health for IDPs despite the fact that the right to health is not enshrined as a Fundamental Right Sri Lanka’s Constitution. The perpetual challenge then remains in the implementation of such Acts, Regulations and Policies; and also in the attitudes and determination of the state which views and values sovereignty over domestic affairs over international law. Concepts of sovereignty tend to be socially and politically conditioned and is therefore not static. Some states clinic to the notion of absolute power at domestic level.

REFERENCES

1. United Nations Guiding Principles on Internal Displacement.
2. IDMC (2009) Internal Displacement: Global Overview of Trends and Developments in 2009. Geneva: Internal Displacement Monitoring Centre
3. Framework for National Responsibility in Addressing Internal Displacement
4. Mozambique Constitution: Fundamental Rights, Duties And Freedoms, Chapter 1. General Principles.
5. Sri Lanka Penal Code
6. Dissanayake, S (2009) "Right to Health" of Internally Displaced Persons, Human Rights Commission of Sri Lanka.
7. Public Security Ordinance (PSO), No. 25 of 1947.
8. Prevention of Terrorism (Temporary Provisions) Act, No 48 of 1979.
9. Dharmawardhane, I. (2013). Sri Lanka's Post-Conflict Strategy: Restorative Justice for Rebels and Rebuilding of Conflict-affected Communities. Perspectives on Terrorism, 7(6).
10. Human Rights Watch (2010). Legal Limbo. HRW publications.USA. Feb, 2010
11. Oxford English Dictionary, source: <http://oxforddictionaries.com/definition/habeas+corpus>
12. Constitution of the Democratic Socialist Republic of Sri Lanka, Article 141, available at <http://www.priu.gov.lk/Cons/1978Constitution/Index.html>.
13. Emergency Regulation of 2005, regulation 19 (3), 21, 49, and 69 (2).
14. International Covenant on Civil and Political Rights (ICCPR), G.A. res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 52, U.N. Doc. A/6316 (1966), 999 U.N.T.S. 171, entered into force Mar. 23, 1976.
15. Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, G.A. res. 39/46, annex, 39 U.N. GAOR Supp. (No. 51) at 197, U.N. Doc. A/39/51 (1984), entered into force June 26, 1987.
16. Convention on the Rights of the Child (CRC), G.A. res. 44/25, annex, 44 U.N. GAOR Supp. (No. 49) at 167, U.N. Doc. A/44/49 (1989), entered into force Sept. 2, 1990.
17. United Nations (2011) Report of the Secretary Generals panel of experts on Sri Lanka. UN publications. Source: www.un.org/News/dh/infocus/Sri_Lanka/POE_Report_Full.pdf
18. Parliament of the Democratic Socialist Republic of Sri Lanka. Geneva Conventions Act, No. 4 of 2006.
19. Parliament of the Democratic Socialist Republic of Sri Lanka, Resettlement Authority Act, No. 09 of 2007.
20. Sri Lanka IDP Protection Working Group, Protection Advocacy Strategy (2008). Available at: http://www.hpsl.lk/docs/protection/IDP%20P%20WG%20Advocacy%20Strategy%202008_1.pdf

A STUDY ON AWARENESS OF “LEGALLY ACCEPTED AGE LIMITS” AMONG SCHOOL CHILDREN IN KANDY DISTRICT SRI LANKA

*Vadysinghe A.N.¹, Munasinghe A.², Abeysekera Y.³, Premasinghe K.⁴,
Gamage S.M.K.⁵, Dassanayaka P.B.⁶*

¹Senior Lecturer, ^{2,3,4,5}Temporary Lecturer, Department of Forensic Medicine,
Faculty of Medicine, University of Peradeniya, Sri Lanka

⁶Consultant Judicial Medical officer, JMO office, Panadura, Sri Lanka

INTRODUCTION

“Age” is an important element in many of our activities and criminal offences. Admissions to school, marriage, driving license etc. are some examples. However according to Sri Lankan law there are legally accepted age limits for such activities, for example, consent for sexual act, age of marriage, selling of liquor, employment etc. Therefore age is a critical factor for most of the offences against children that can result in various forms of child abuse. 31% of total population of Sri Lanka consists of children (age 0-18 years).¹

Child abuse is often considered to demonstrate an iceberg phenomenon and only a small proportion found to be seen above the surface.² In year 2009, more than 4000 cases or nearly 30% of all cases pending before the High Courts are related to child abuse, a survey undertaken by the Ministry of Justice and Law Reforms has revealed.³ And with each year the numbers of child abuse including child sexual abuse have increased dramatically. The National Child Protection Authority (NCPA) has received 1271 complaints in the year 2008 and that these complaints have been classed as C.A (Child Abuse) and C.R (Child Rights Abuse). Of these 1271 complaints, 511 have been classed as C.A. and 760 have been classed as C.R. The NCPA has already received 793 complaints on child abuse, cruelty and a range of other perversions up to July in 2009.⁴

Police statistics show the total number of child rape cases in 2011 as 1,463 and the figure jumped to 1,759 cases in 2012. These records also reveal a total of over 2,000 sexual offenses against children, besides rape, in 2011

and the child-molestation cases in 2012 soared to over 5,000.⁵ The total number of all crimes against children, which besides sex crimes include crimes of violence, abduction, trafficking and other offenses which increased by a dramatic 64% between 2011 and 2012.⁵

Therefore child abuse and maltreatment is an increasing problem in Sri Lanka and it is rapidly becoming a global problem.

When reviewing the available literature done to assess the education level of victims and perpetrators of sexual abuse, majority of victims were in the school going age and it has been showed that the education level of both victims and perpetrators were very low.^{6,7,8,9}

Although no organization — government or non-government, or even those working in the field of child sexual abuse are able to give proper statistics of the incidence in Sri Lanka few studies done in Sri Lanka among teens and undergraduates revealed that considerable amount have been abused in their life. A study on child abuse in Anuradhapura, Colombo South and Ratnapura revealed that girls were at a higher risk of being abused than the boys especially in the 14-16 age groups. Furthermore affected victims belonged to the school going age or more than 5 years old.^{10,11}

Also in our experience both the victims and perpetrators of sexual abuse are underage and more commonly they belong to the school going age. This pattern is seen in both local and international studies.^{7,8} Most children and teens are not aware that some acts they perform are contrary to the law. A study done to assess the awareness of medico-legal issues in victims and

assailants of alleged sexual abuse by the author has revealed grossly inadequate knowledge on both parties.⁹ That study assessed the knowledge on age limits to define a child, age of marriage and the age to consent for sexual activity in girls. Due to this inadequacy of knowledge either related with law or act, they are being vulnerable to be charged at the court of law.

Especially due to the lack of knowledge regarding legally accepted age limits among general public more children are prone to get abused by physical, sexual, and psychological means. This lack of knowledge has been evident by the increasing use of children for drug smuggling, prostitution and other criminal activities which is a rising issue that should be promptly addressed.¹²

It should be stated that what need to be achieved through education cannot be achieved by harsh laws and stringent penalties.

On this background it is hypothesized that the inadequate knowledge regarding awareness of legally accepted age limits among school children, is a factor for children being abused and being victims and perpetrators of various crimes.

OBJECTIVES

To evaluate the awareness regarding the legally accepted age limits among school children and to assess any significant difference in awareness according to the gender and type of school (provincial, national).

MATERIALS AND METHODS

Data were collected from five schools in Kandy zone including both national and provincial

schools during 2008-09 period from the 14-19 year age group. Classes from grade 9 and above were randomly selected to include 2 classes from each grade. Questionnaires were administered to the entire class and after a brief introduction they were asked to fill the questionnaires within 20 — 30 minutes. Any queries that arose during filling up the questionnaires were clarified. A brief discussion and an awareness programme were carried out after collection of completed questionnaires.

Data were analyzed using Statistical software MINITAB.

RESULTS

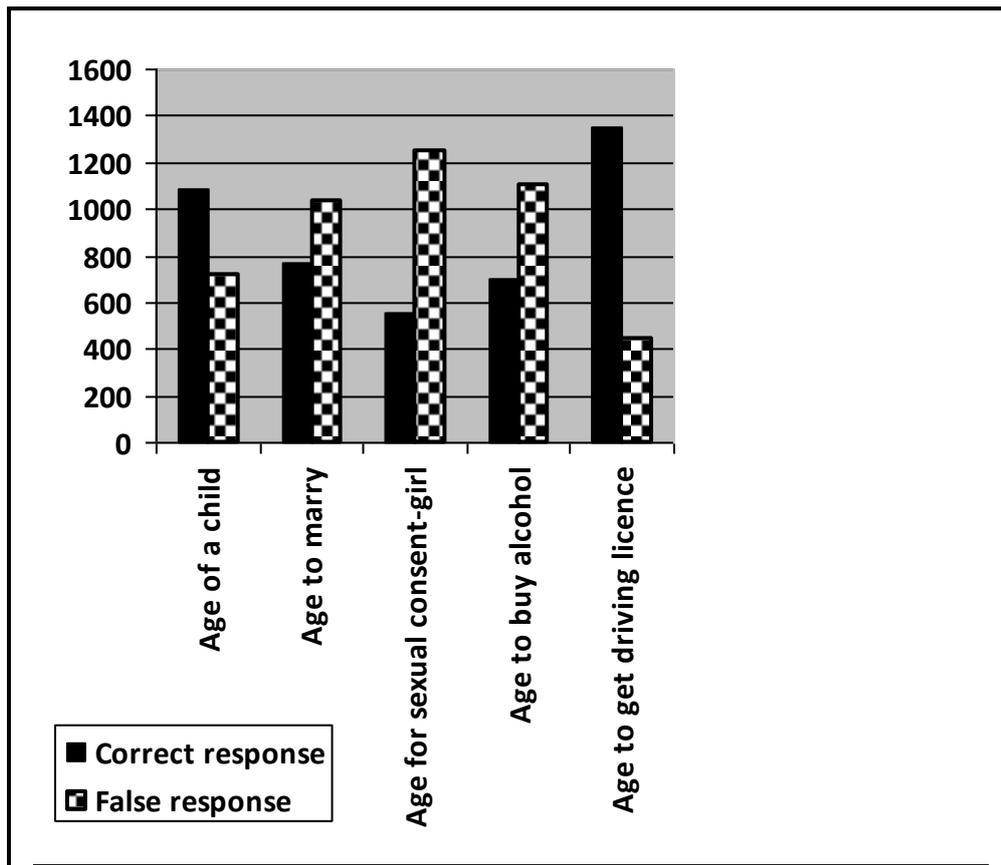
Total study sample was 1812. Out of that 7 questionnaires were discarded due to irrelevant answers. Results are displayed below (Table 01).

Out of 1805, 1702 (94.3%) were aware that there is an age limit to be known as a “child” and 1090 (60.4%) had responded with the exact age limit. From the 1642 (91%) who had responded positively for the age of marriage, only 773 (42.8%) knew the exact age limit. The number decreased further down when it comes to the legally accepted age limit for sexual activities for girls to 555 (30.7%).

700 (38.8%) of the total study sample were aware of the legally accepted age limit for buying alcohol/liquor while 61.2% were unaware. 1356 (75.1%) responded correctly for the eligible age to get driving licence (see graph 01).

Table 01: Percentages of awareness in the total study sample

Question	Number of Correct Responses	Number of Incorrect Responses
1. Age limit to be known as a child	1090 (60.4%)	715 (39.6%)
2. Age of marriage	773 (42.8%)	1032(57.2%)
3. Age limit for sexual activities for girls	555(30.7%)	1250(69.3%)
4. Age to buy alcohol/liquor	700(38.8%)	1105(61.2%)
5. Age to get driving licence	1356(75.1%)	446(24.9%)



Graph 01: Number of response to the questions

Fishers exact test performed at 5% significance ($\alpha=0.05$) to find out whether there is a significant difference of awareness regarding the following aspects between children in **national and provincial schools** and between **males and females** of the selected sample.

1. Legally accepted upper age limit to be called a child.
2. Legally accepted age to marry
3. Legally accepted age for a girl to be able to give consent for sexual activity
4. Legally accepted age to be able to buy alcohol/liquor
5. Legally accepted age to be eligible for obtaining driving license

1. Comparison of national and provincial schools regarding the awareness of “Legally accepted upper age limit to be called a child

Fisher's exact test: P-Value = 0.172

Results are not statistically significant at 5% alpha.

There is no statistically significant difference in awareness between national and provincial schools.

2. Comparison of males and females regarding the awareness of “Legally accepted upper age limit to be called a child”

Fisher's exact test: P-Value = 0.493

Results are not significant at 5% alpha.

Therefore there is no statistically significant difference in awareness between males and females.

3. Comparison of national and provincial schools regarding the awareness of “Legally accepted age for marriage”

Fisher's exact test: P-Value = 0.000

Results are significant at 5% alpha.

Therefore students in national schools show a significantly higher knowledge.

4. Comparison of males and females regarding the awareness of “Legally accepted age for marriage”

Fisher's exact test: P-Value = 0.000

Results are significant at 5% alpha.

Therefore female students show a significantly higher knowledge on marriage age.

5. Comparison of national and provincial schools regarding the awareness of “Legally accepted age for a girl to give consent for sexual activity “

Fisher's exact test: P-Value = 0.000

Results are significant at 5% alpha.

Students in national schools show a significantly higher knowledge.

6. Comparison of males and females regarding the awareness of “Legally accepted age for a girl to give consent for sexual activity”

Fisher's exact test: P-Value = 0.300

Results are not significant at 5% alpha.

There is no statistically significant difference between awareness of males and females.

7. Comparison of national and provincial schools regarding the awareness of “. Legally accepted age to be able to buy alcohol/liquor”

Fisher's exact test: P-Value = 0.141

Results are not significant at 5% alpha.

Therefore there is no statistically significant difference of awareness between national and provincial schools.

8. Comparison of males and females regarding the awareness of “Legally accepted age to buy alcohol/liquor”

Fisher's exact test: P-Value = 0.824

Results are not significant at 5% alpha.

Therefore there is no statistically significant difference of awareness between males and females.

9. Comparison of national and provincial schools regarding the awareness of “Legally accepted age to be eligible for obtaining driving license”

Fisher's exact test: P-Value = 0.000

Results are significant at 5% alpha.

Therefore students in national schools show a significantly higher awareness.

10. Comparison of males and females regarding the awareness of “Legally accepted age to be eligible for obtaining driving license”

Fisher's exact test: P-Value = 0.702

Results are not significant at 5% alpha.

Therefore there is no statistically significant difference of awareness between males and females.

Table 02: Summary of Results

	Whether there is a significant difference in awareness between National and Provincial schools?	Whether there is a significant difference in awareness according to gender? (Male/ Female)
1. Age limit to be called a child	No significant difference	No significant difference
2. Age to marry	Significantly higher awareness in National schools.	Significantly higher awareness in female students
3. Age for a girl to be able to give consent for sexual activity	Significantly higher awareness in National schools.	No significant difference in awareness.
4. Age to be able to buy alcohol/liquor	No significant difference	No significant difference
5. Age to be eligible in obtaining driving licence.	Significantly higher awareness in National schools.	No significant difference

There was no significant difference in awareness about majority of issues, according to gender. However awareness regarding 3 out of 5 issues was significantly higher in National schools compared to provincial schools.

DISCUSSION

‘Age’ is an important factor in many of our activities as well as the medico-legal issues such as criminal offences. According to this

study the school children were mostly aware of the age limits to be able to obtain a driving license (75.1%). This may probably be due to increasing availability and use of personal vehicles from young ages in households. It was followed by the knowledge on age limits to be known as a child (60.4%). Other age limits such as the age to marry, age for a girl to consent for sexual activity and age limit to buy liquor, the subjects had a grossly inadequate knowledge. However a study done recently, among victims and assailants of sexual abuse have showed that more than 90% in that target group were unaware of the legal age limit of a child.⁹ Furthermore more than 70% were unaware of the legal age limits of marriage and the age limit for a girl to consent for sexual activity. These victims mainly belonged to the school going age but their education level was very poor with majority belonging to no schooling/ up to grade 10 category.

The age limits to buy liquor was not known by about 60% of children. This may be due to low level of alcohol consumption during the school age. However it should be stated that children were being sold drinks irrespective of their age according to a study conducted in England.¹³ Although the social and cultural backgrounds are different in Sri Lanka the finding of selling liquor to underage should still be kept in mind since it can cause adolescents to be unaware of the legal age limits to buy them. This topic should need further studies in our setting.

The study has revealed that according to the gender, there was no significant difference in awareness about majority of the age limits that were assessed. The awareness on age to marry does have a significant difference between provincial and national schools as well as higher awareness in females.

Also there was a significant difference in awareness regarding the age of a girl to consent for sexual activity, between the national and provincial schools, being higher in students of national schools but the difference was not significant according to gender.

There are hardly any studies done, either locally or internationally, to assess the awareness of age limits particularly in school children.

However analysing the numerous studies done to assess the education level of victims and perpetrators of sexual abuse, majority of victims were of school going age and the studies have revealed that the education level of both victims and perpetrators were very low.^{6,7,8,9}

Interestingly a study done in Saudi Arabia has revealed that the awareness of the majority of the school professionals also have a low to intermediate level of awareness of child maltreatment.¹⁴ Considering that school professionals play a significant role in children's lives, as they spend a great deal of time with them and are hence essential to protecting and identifying those in danger or at risk, the need to make them aware is also critical in decreasing the number of cases of child abuse.

These study results can be utilized in conducting awareness programs for school children with the addition of knowledge to the school curriculum. And also the provincial schools should be given priority in areas where they lack knowledge significantly.

In prevention of child abuse, parents have a vital role. But still the vast majority of the people in the country are not aware of the changes brought about in the law in 1995.¹⁵

Also studies have highlighted the minimal and inadequate knowledge and practice in parents regarding this matter.¹⁶ These findings should be strictly taken into account and the need for child abuse prevention education programmes for parents, to improve their awareness is a growing requirement.

CONCLUSION

In conclusion, majority of school children in our study sample were unaware of the legally accepted age limits on various issues. Therefore in general the awareness regarding legally accepted age limits is insufficient in school children and this issue needs to be addressed.

SUGGESTIONS

We suggest the need to include an introduction to legally accepted age limits into school curriculum as one method.

In addition, as awareness in Provincial schools is significantly lower when compared to the national schools, we suggest the need to conduct educational programmes at provincial level by relevant authorities.

Also since there are no studies that have evaluated school professionals' awareness on the matter, it would be a future topic to plan a study, which would ensure the protection of children at the school level.

REFERENCES

1. Elders and Childrens' Day Today, *Daily Mirror*, 2009.October 1:1
2. Denial, Managing child abuse a hand book for medical officers, World Health Organization:2004:11
3. Kirinde C., Child abuse cases cries out in high courts. *The Sunday Times*, 2009. October 18:3.
4. De Silva D.G.H, Christopher H., *A Manual for medical officers in Sri Lanka*.2000;1-2.
5. Anjani T. Sri Lanka Struggles to Contain a Growing Epidemic of Child Abuse. *Time:World*,13th August. 2013 Available at: <http://http://world.time.com/2013/08/13/sri-lanka-struggles-to-contain-a-growing-epidemic-of-child-abuse/> [Accessed 20 Sep 2013]
6. Ganguly RP, Patron KK, Jha T, Bhattacharya AR, Sarkar D, Sexual assault and its medical, Medico-legal and Social aspects-a retrospective study. *J Indian Med Assoc.* 2010;108(10): 682-90.
7. Al-Azad, M., Rahman, Z., Ahmad, M., Wahab, M., Ali, M. and Khalil, M., Socio- demographic characteristics of alleged sexual assault(Rape) cases in Dhaka city. *Journal of Armed Forces Medical College.* 2011, 7(2), pp. 21-24
8. Manzoor, M, Hashmi, N.R., and Mukhtar, F , Medico-legal Aspects of Alleged Rape Victims in Lahore, *Journal of the College of Physicians and Surgeons Pakistan*, 2010, 20 (12), pp. 785-78
9. Dassanayake P, Vadysinghe A, Abeysekera Y, Manoratne N, Nissanka W, A study on awareness of medico-legal aspects among victims and assailants regarding alleged sexual assault, *Annual scientific sessions, Medico-legal society of Sri Lanka.* 14th September, 2013, pp. 37
10. Colombage SM, Dassanayaka P.B, Waidyaratna D.L., *A study on child abuse in Anuradhapura, Colombo South and Ratnapura.* 2005; 11.
11. 3 children raped daily in Sri Lanka. *The Sunday Times.* 10th October, 2010.[online] Available at: http://www.sundaytimes.lk/101010/News/nws_02.html#top. [Accessed 20 Aug 2013]
12. 6 Child labourers in drug smuggling. *Sri Lanka Mirror*,13th June. 2013 Available at: <http://srilankamirror.com/news/8114-child-labourers-in-drug-smuggling> [Accessed 30 Aug 2013]
13. Maisey A, Davies G. Lessons to be learned: a case study approach, Underage drinking in adolescents. *The Journal of the Royal Society for the Promotion of Health.* 2003; 123: 52-54.
14. Albuhairan F, Inam S, Aleissa M, Noor I, Almuneef M., Self-reported awareness of child maltreatment among school professionals in Saudi Arabia: Impact of CRC ratification. *Child abuse and neglect.* 2011; 35: 1032– 1036
15. Parliament of the Democratic Socialist Republic of Sri Lanka, *Penal code (Amendment)Act No 25 of 1995*, 31st October ,1995.
16. Chen J., Chen D., Awareness of child sexual abuse prevention education among parents of Grade 3 elementary school pupils in Fuxin City, China. *Health Education Research.* 2005; 20 (5): 540-547.

ACKNOWLEDGEMENTS

Statistical assistance - Dr. C.D. Wickramasinghe, Department of Forensic Medicine.

STATURE ESTIMATION FROM THE ANTHROPOMETRIC MEASUREMENTS OF FOOT OUTLINE IN ADULT INDIGENOUS MELANAU ETHNICS OF EAST MALAYSIA BY REGRESSION ANALYSIS

Hairunnisa Bt Mohd Anas Khan¹ and T. Nataraja Moorthy²

¹ Forensic Division, Chemistry Department of Malaysia, Bintulu, Sarawak State, East Malaysia.

² School of Health Sciences, Universiti Sains Malaysia, Health Campus Kubang Kerian, Kelantan State, Malaysia.

ABSTRACT

A person's stature is an identifying characteristic in forensic investigation. Footprint is the one of the valuable physical evidence encountered in the crime scenes. Analysis of footprints helps in estimation of an individual's stature because of the existence of strong correlation between foot impression and height. Foot impressions are still found at crime scenes, since offenders often tend to remove their footwear either to avoid noise or to gain better grip in climbing walls, etc., while entering or exiting. In Asian countries like India, Malaysia, Sri Lanka, Thailand, Indonesia, there are people who still have the habit of walking barefoot. The footprint provides the size dimensions of the foot's plantar surface actually touching the floor or hard surface, which produces a two-dimensional footprint while foot outline provides the size parameters of the fleshed bare foot and also represents the boundaries of the foot's impression in soft soil, mud, or any other substances that produces a three-dimensional footprint impression. The review of literature revealed that very limited studies were conducted on stature estimation from foot outline measurements. Most of the foot/foot impression studies have been conducted on mixed population. The researchers cautioned that racial and cultural aspects of foot morphology must be considered while conducting the foot impression study. In stature estimation using foot impression, formulae derived for a particular population is erroneous to apply for other populations. Hence the present study aims to derive population specific equations to estimate stature from foot outlines

of indigenous Melanau ethnics of East Malaysia.

INTRODUCTION

An aspect of human identification that has received scant attention from forensic anthropologists is the study of human feet and the footprints made by the feet¹. There is also a relationship between each part of the body and the whole body. Nothing exemplifies this truth more than the relationship that various parts of the body have to the stature of an individual². In this manner, an individual's footprint may represent his or her identity. The characteristic features in foot impression can provide useful clues to establish identity whenever complete or partial two dimensional (2D) and three dimensional (3D) foot impressions are recovered at the crime scenes³. In Asian countries like India, Malaysia, Sri Lanka, Thailand, Indonesia, there are people who still have the habit of walking barefoot. Foot impressions are still found at crime scenes, since offenders often tend to remove their footwear either to avoid noise or to gain better grip in climbing walls, etc., while entering or exiting⁴. Analysis of foot⁵⁻¹¹ and footprints¹²⁻¹⁸ help in estimation of an individual's stature because of the existence of a strong correlation between one's stature and foot/footprint/foot outline length. The footprint provides the size dimensions of the foot's plantar surface actually touching the floor or hard surface, which produces a two-dimensional (2D) footprint impression. On the other hand the foot outline provides the size parameters of the fleshed bare foot and also represents the boundaries of the foot's impression in soft soil, mud, or any other substances that produces a three-dimensional

(3D) footprint impression¹². The review of literature revealed that very limited studies were conducted on stature estimation from foot outline measurements¹⁹⁻²². Most of the foot/foot print studies have been conducted on mixed population. The researchers cautioned that racial and cultural aspects of foot morphology must be considered while conducting the foot print study²⁰. The people from different regions and races in a country bear different morphological features and hence a single formula cannot represent for all races or regions in a country⁴⁻²⁰. The researchers have concluded that toes-to-heel footprint/foot outline length in a foot impression has more reliability of prediction than from any other measurements, such as breadth at ball/heel and big toe breadth/length¹⁷⁻²². Hence, the present study attempts the stature estimation from all toes-to-heel lengths in a foot outline and to derive population specific regression equations suitable for Melanau ethnics, an endogamous group in Borneo Island, East Malaysia.

MATERIALS AND METHODS

Research location

The study was carried out at Sarawak state, East Malaysia. Sarawak state is home to 28 ethnic groups, each with their own distinct language, culture and lifestyle. The subjects were from colleges, universities and general public. The Melanau are a people who live on the island of Borneo, primarily in Sarawak, east Malaysia. They are among the earliest settlers of Sarawak, and speak a Northwest Malayo-Polynesian language. They are mostly farmers, fishermen, and reputed as some of the finest boat-builders and craftsmen.

Figure-1 depicts the sampling area in East Malaysia located in Borneo Island. Before started the research, concurrence was obtained from Sarawak Chief Minister vide No. JKM.P/DEV/16/005 /12(44), for sample collection. Informed consent was also obtained from all participants and followed the procedure in accordance with the ethical standards of Universiti Sains Malaysia Human Research Ethic Committee {Ethical approval No. USMKK/ PPP/ JEMPeM [247.4.(2.12) / Amend (01) dated 8th April 2012 of USM]}.



Source: www.malaysiamap.org/map-search-detail1c0f.html

Figure 1: Map of Malaysia showing the sampling area, Sarawak state of east Malaysia in Borneo Island

Sample collection

Recording of stature

The study involved 210 adult Melanaus (105 males, 105 females) of age ranged from 18 to 59 years. Subjects with any apparent foot-related disease, pregnancy, orthopedic deformity, physical impairment, injury, disorders and age below 18 years were excluded from the study. Stature of each subject was measured using a portable body meter measuring device (SECA model 206) following the standard procedure²⁰⁻²². Considering the diurnal variation in stature, the height of the subjects was measured approximately at a fixed time in the evening. The diurnal change in height of a person was reported and confirmed by the researchers²³⁻²⁴. The stature of each subject was measured following Krishan²⁰ and Nataraja Moorthy²¹ as follows. Stature was measured without head and footwear using a portable body meter measuring device. The body meter was suspended upright against the wall and measurements were taken to the nearest 0.5 cm. The subject was advised to stand under the body meter with his heels together and weight evenly distributed between both feet. Stature was measured in cm as the vertical distance between the vertex and the sole of the foot when the individual was standing barefoot with head held in the Frankfurt horizontal plane with eyes looking forward. The measurements were repeated until concordant values were achieved.

Recording of foot outline and diagonal length measurements

Just prior to research participation, the subjects were advised to wash their feet with soap and water. Then the subject was requested to place the left foot on an A4 size white paper and the foot outline was drawn with a sharp-pointed pencil. The pencil was held perpendicular to the paper as it traced around the margin of the foot. With the foot still on the paper, the anatomical landmarks of the foot, namely mid-rear heel point (pternion, OP) in the base line BL and

most anterior points of all toes (LT1–LT5) were marked. The procedure was repeated for the right foot and for the other subjects. Following Krishan²⁰ and Nataraja Moorthy²¹, the designated longitudinal axis (DLA) and base line (BL) were drawn on the foot outlines. Then five diagonal foot outline lengths were taken from the mid-rear heel point (OP) to most anterior point of each left toe (LT1, LT2, LT3, LT4, and LT5). The left foot outline length measurements were designated as OPLT1, OPLT2, OPLT3, OPLT4, and OPLT5. The procedure was repeated for the right foot and the right foot outline lengths were designated as OPRT1, OPRT2, OPRT3, OPRT4, and OPRT5. Figure-2 shows the land marks and length measurements in a right foot outline. All foot outlines and information relating to participants were coded with sample ID for anonymity.

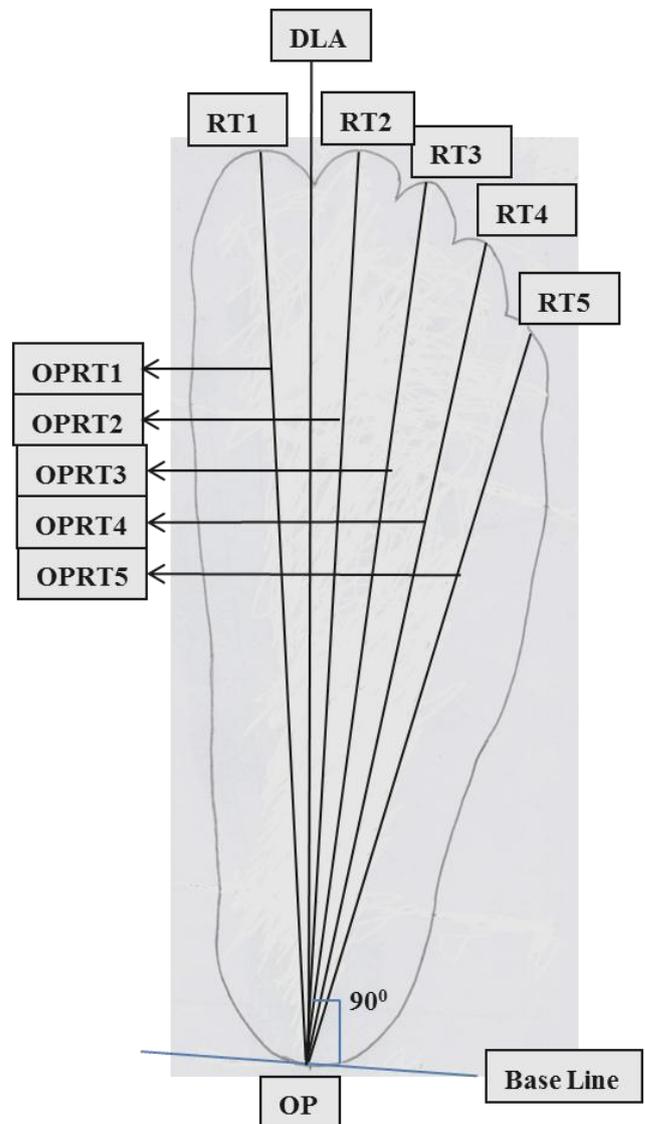


Figure 2: Landmarks and diagonal length measurements on right foot outline

Statistical analysis

The data were analyzed using PASW Statistics version 20 (Predictive Analytic Software). Bilateral asymmetry was calculated for each of the foot outline measurements and tested for significance using one sample t-test. Pearson's correlation coefficients (R) between various feet outline lengths and stature were obtained. The linear regression analysis method was employed to derive regression equations for stature estimation from various foot outline lengths since stature estimation from foot outline length is more accurate and reliable with regression analysis²⁵.

RESULTS

All footprint and foot outline measurements exhibit statistically positive significant correlation with stature. Table-1 shows the descriptive statistics of stature measurements in males, females and pooled sample. In males, the stature ranges from 153.5 to 187.5 cm (mean 165.7 cm) and in females, it ranges from 137.0 to 170.2 cm (mean 153.3 cm). In pooled sample, the stature ranges from 137.0 to 187.5 cm. The results showed that mean stature is found to be significantly higher in males than females.

Table 1: Descriptive statistics of stature in males, females and pooled sample of adult Melanau ethnics in East Malaysia.

Variable	Male (N = 105)					Female (N = 105)					Pooled sample (N =210)				
	Min	Max	RD	Mean	SD	Min	Max	RD	Mean	SD	Min	Max	RD	Mean	SD
Stature	153.5	187.5	34.0	165.7	5.7	137.0	170.2	33.2	153.3	5.9	137.0	187.5	50.5	159.5	8.5

SD: standard deviation; RD: range difference; Min: minimum; Max: maximum;

Table-2 depicts descriptive statistics of foot outline lengths in males, females and pooled sample. The mean foot outline length measurements in males (21.3-25.3 cm) are found to be significantly higher than females (19.2-21.1) showing the existence of gender difference. First toe-heel length (OPRT1 and OPLT1) measurement is found to be the longest in both males and females on right and left sides.

Table 2: Descriptive statistics of foot outline length (in centimetres) measurements in males, females and pooled sample of adult Melanau ethnics in East Malaysia.

Variables	Male (N =105)						Female (N=105)						Pooled sample (N=210)					
	N	RD	Min	Max	Mean	SD	N	RD	Min	Max	Mean	SD	N	RD	Min	Max	Mean	SD
OPLT1	105	7.0	22.9	29.9	25.3	1.1	105	5.5	20.5	26.0	23.0	1.0	210	9.4	20.5	29.9	24.1	1.6
OPLT2	105	7.7	22.8	30.5	25.2	1.1	105	6.0	19.7	25.7	22.7	1.1	210	10.8	19.7	30.5	24.0	1.7
OPLT3	105	7.6	22.1	29.7	24.4	1.1	105	5.9	18.9	24.8	23.0	1.1	210	10.8	18.9	29.7	23.2	1.6
OPLT4	105	7.3	20.8	28.1	23.1	1.0	105	5.2	18.3	23.5	20.8	1.0	210	9.8	18.3	28.1	22.0	1.5
OPLT5	105	6.6	19.2	25.8	21.4	1.0	105	5.1	16.7	21.8	19.3	1.0	210	9.1	16.7	25.8	20.3	1.4
OPRT1	105	7.0	23.0	30.0	25.3	1.1	105	5.2	20.5	25.7	23.1	1.0	210	9.5	20.5	30.0	24.2	1.5
OPRT2	105	7.1	22.9	30.0	25.1	1.1	105	5.7	19.9	25.6	22.7	1.1	210	10.1	19.9	30.0	23.9	1.6
OPRT3	105	7.5	21.9	29.4	24.3	1.1	105	5.4	19.3	24.7	21.9	1.1	210	10.1	19.3	29.4	23.1	1.6
OPRT4	105	7.5	20.6	28.1	23.0	1.0	105	4.9	18.4	23.3	20.8	1.0	210	9.7	18.4	28.1	21.9	1.5
OPRT5	105	6.3	19.2	25.5	21.3	1.0	105	4.5	17.0	21.5	19.2	0.9	210	8.5	17.0	25.5	20.3	1.4

Min: minimum; Max: maximum; OPLT1 to OPLT5: left lengths from anterior part of toes outlines LT1-LT5 to outline mid-rear outline heel point OP; OPRT1 to OPRT5: right lengths from anterior part of toes outline RT1-RT5 to mid-rear outline heel point OP; RD: range difference; SD: standard deviation; N : number of samples.

Table 3 presents means, standard deviations, T-value and P-value of one-sample t-test of bilateral differences (left-right) in foot outline length measurements among males and females. In foot outlines, bilateral asymmetry is found at T-3 in males and no significant asymmetry is observed in other toes.

Table 3: One-sample t-test of bilateral differences (left-right) in foot outline length measurements among males and females in adult Melanau ethnics in East Malaysia.

Variables	Male (N = 105)				Female (N = 105)			
	Mean difference (left-right)	SD	t-Value	P-Value	Mean difference (left-right)	SD	t-Value	P-Value
T-1 (OPLT1 –OPRT1)	-0.0352	0.36	-1.00	0.321	-0.0876	0.33	-2.68	0.009*
T-2 (OPLT2 –ORT2)	0.0705	0.36	2.03	0.045	-0.0114	0.34	-0.34	0.731
T-3 (OPLT3 – OPRT3)	0.1076	0.31	3.57	0.001*	0.0371	0.34	1.11	0.268
T-4 (OPLT4 – OPRT4)	0.0848	0.31	2.80	0.006*	0.0171	0.31	0.56	0.577
T-5 (OPLT5 – OPRT5)	0.0857	0.30	2.94	0.004*	0.0714	0.32	2.28	0.024*

OPLT1 to OPLT5: left lengths from anterior part of toes outlines LT1- LT5 to outline mid-rear outline heel point OP; OPRT1 to OPRT5: right lengths from anterior part of toes outline RT1-RT5 to outline mid-rear outline heel point OP; SD:standard deviation. *p-value < 0.05 is significant.

Table 4: Linear regression equations for stature estimation (in centimeters) from different foot outline length measurements on left and right sides among adult male Melanau ethnics in East Malaysia (N= 105).

Variables	Regression Equations	SEE	R	R ²	Adj,R ²	Coefficient of t-test	ANOVA
OPLT1	65.656 + 3.956 OPLT1	3.576	0.780	0.608	0.604	12.635	159.645(1, 103) ; P<0.001
OPLT2	69.155 + 3.831 OPLT2	3.730	0.757	0.573	0.569	11.765	138.420(1, 103) ; P<0.001
OPLT3	70.887 + 3.888 OPLT3	3.806	0.746	0.556	0.551	11.352	128.862(1, 103) ; P<0.001
OPLT4	69.664 + 4.161 OPLT4	3.823	0.743	0.552	0.547	11.258	126.735(1, 103) ; P<0.001
OPLT5	74.457 + 4.264 OPLT5	3.914	0.728	0.530	0.526	10.782	116.261(1, 103) ; P<0.001
OPRT1	64.754 + 3.986 OPRT1	3.812	0.745	0.554	0.550	11.320	128.135(1, 103) ; P<0.001
OPRT2	66.680 + 3.941 OPRT2	3.886	0.733	0.537	0.532	10.926	119.374(1, 103) ; P<0.001
OPRT3	70.861 + 3.906 OPRT3	3.910	0.729	0.531	0.527	10.803	116.705(1, 103) ; P<0.001
OPRT4	72.344 + 4.060 OPRT4	3.874	0.735	0.540	0.535	10.990	120.785(1, 103) ; P<0.001
OPRT5	75.885 + 4.214 OPRT5	3.924	0.727	0.528	0.523	10.730	115.130(1, 103) ; P<0.001

OPLT1 to OPLT5: left lengths from anterior part of toes outline LT1- LT5 to outline mid-rear heel point OP; OPRT1 to OPRT5: right lengths from anterior part of toes outline RT1-RT5 to outline mid-rear heel point OP; SEE: standard error of estimate; R²: coefficient of determination ; Adj, R²: Adjusted R². p-value < 0.001 is significant.

Table 5: Linear regression equations for stature estimation (in centimeters) from different foot outline length measurements on left and right sides among adult female Melanau ethnics in East Malaysia (N=105).

Variables	Regression Equations	SEE	R	R ²	Adj,R ²	Coefficient of t-test	ANOVA
OPLT1	42.873 + 4.802OPLT1	3.195	0.844	0.712	0.709	15.955	254.575(1, 103) ; P<0.001
OPLT2	54.488 + 4.346OPLT2	3.389	0.822	0.676	0.673	14.651	214.644(1, 103) ; P<0.001
OPLT3	57.188 + 4.375OPLT3	3.540	0.804	0.646	0.643	13.721	188.277(1, 103) ; P<0.001
OPLT4	55.557 + 4.692OPLT4	3.420	0.818	0.670	0.667	14.456	208.974(1, 103) ; P<0.001
OPLT5	59.749 + 4.854OPLT5	3.697	0.784	0.614	0.611	12.808	164.046(1, 103) ; P<0.001
OPRT1	41.916 + 4.826OPRT1	3.304	0.832	0.692	0.689	15.206	231.224(1, 103) ; P<0.001
OPRT2	53.807 + 4.374OPRT2	3.551	0.803	0.644	0.641	13.654	186.422(1, 103) ; P<0.001
OPRT3	53.809 + 4.536OPRT3	3.530	0.805	0.648	0.645	13.781	189.928(1, 103) ; P<0.001
OPRT4	54.815 + 4.732OPRT4	3.478	0.812	0.659	0.655	14.095	198.681(1, 103) ; P<0.001
OPRT5	58.766 + 4.924OPRT5	3.824	0.766	0.587	0.583	12.106	146.565(1, 103) ; P<0.001

OPLT1 to OPLT5: left lengths from anterior part of toes outline LT1- LT5 to outline mid-rear heel point OP; OPRT1 to OPRT5: right lengths from anterior part of toes outline RT1-RT5 to outline mid-rear heel point OP; SEE: standard error of estimate; R²: coefficient of determination ; Adj, R² : Adjusted R². p-value < 0.001 is significant

Table 6: Linear regression equations for stature estimation (in centimeters) from different foot outline length measurements on left and right sides among pooled samples of adult Melanau ethnics in East Malaysia (N=210).

Variables	Regression Equations	SEE	R	R ²	Adj,R ²	Coefficient of t-test	ANOVA
OPLT1	40.922 + 4.912OPLT1	3.506	0.911	0.830	0.829	31.880	1016.317(1, 208) ; P<0.001
OPLT2	49.083 + 4.607OPLT2	3.644	0.904	0.816*	0.816*	30.420	925.403(1, 208) ; P<0.001
OPLT3	50.867 + 4.687OPLT3	3.756	0.897	0.805	0.804	29.304	858.698(1, 208) ; P<0.001
OPLT4	49.156 + 5.026OPLT4	3.712	0.900	0.810	0.809	29.735	884.153(1, 208) ; P<0.001
OPLT5	52.503 + 5.262OPLT2	3.909	0.888	0.789	0.788	27.879	777.257(1, 208) ; P<0.001
OPRT1	38.327 + 5.007OPRT1	3.683	0.901	0.813	0.812	30.032	901.903(1, 208) ; P<0.001
OPRT2	45.985 + 4.742OPRT2	3.804	0.894	0.800	0.799	28.845	832.054(1, 208) ; P<0.001
OPRT3	48.309 + 4.812OPRT3	3.816	0.894	0.799	0.798	28.736	825.776(1, 208) ; P<0.001
OPRT4	48.159 + 5.083OPRT4	3.805	0.894	0.800	0.799	28.840	831.741(1, 208) ; P<0.001
OPRT5	52.464 + 5.285OPRT5	3.983	0.884	0.781	0.780	27.213	740.568(1, 208) ; P<0.001

OPLT1 to OPLT5: left lengths from anterior part of toes outline LT1- LT5 to outline mid-rear heel point OP; OPRT1 to OPRT5: right lengths from anterior part of toes outline RT1-RT5 to outline mid-rear heel point OP; SEE: standard error of estimate; R²: coefficient of determination ; Adj, R² : Adjusted R². p-value < 0.001 is significant

Tables - 4 to 6 show the linear regression equations for stature estimation in adult males, females and pooled sample through various foot out line lengths with ANOVA. The standard error of estimate (SEE) in case of female foot outline length (3.195-3.824) is comparatively lower than that of males (3.576-3.914) and pooled sample (3.506-3.983). The correlation coefficient (R) between stature and various foot

outline lengths is statistically significant (<0.001). R values are found to be more in the pooled sample (0.884-0.911) when compared with males ((0.727-0.780) and females (0.766-0.844). The coefficient of determination (R²), the predictive accuracy, is found to be higher in the pooled sample (0.781-0.830) when compared with males (0.528-0.608) and females (0.587-0.712) and all measurements are

found to be positive and statistically significant for stature estimation.

DISCUSSION

It is common to find the 2D footprints at indoor crime scenes while foot outline drawn from 3D footprint at outdoor crime scenes mostly left by perpetrators²². The foot outline can be scientifically analyzed to establish the biological profile and confirm an association of an accused with the crime scene. The present investigation shows that stature and foot outline size are found to be larger in males than females, showing the existence of a statistically significant sex difference. This may be attributed to general male-female differences and natural size in both sexes²⁶. This finding is concordant with previous research findings^{4,10,17,21,22}. The size of male left foot outline is found to be slightly larger in T-3 than the right side but in female the bilateral asymmetry i.e. left-sided asymmetry is not significant. The significant bilateral asymmetry were observed by other researchers in Egyptian¹⁴, Malaysian Malays¹⁷, north Indian male Gujjars²⁰, Malaysian Chinese²¹, Ibans of East Malaysia²² and Indian population²⁶. Philip did not find significant bilateral asymmetry while working on the footprints of south Indian population². Similarly Ilayperuma⁵ and Robbins²⁷ also did

not find significant bilateral asymmetry in various measurements of the feet of the Sri Lanka and U.S. population. Researchers indicated that regression equations can be derived for stature estimation using foot and hand measurements with a great accuracy and a small SEE, i.e. about 2–6 cm²⁸. The age range of the subjects in this investigation is considered appropriate since the average length of adult's foot is attained at 16 years in male and 14 years in females^{29,30}. Commonly, stature at 18 years is accepted as adult, although there are small increments in stature after this^{31,32}. It is interesting to note that the correlation coefficient (R) between stature and foot outline measurements regardless of sex, i.e. when male and female subjects are pooled together, gave a more significant result than the correlations separately obtained for the males and females. The scatter graphs obtained by plotting various foot outline lengths and height in the pooled sample visually (Figure 3) confirm the strong positive correlation between height and foot outline length measurements. This finding is consistent with previous studies of Malays⁴ Malaysian Chinese²¹ and Indians²⁶. Considering real crime scenarios, where the sex of the perpetrator is unknown, it is suggested that a better regression equation that can be used for stature estimation is the one without sex indicators.

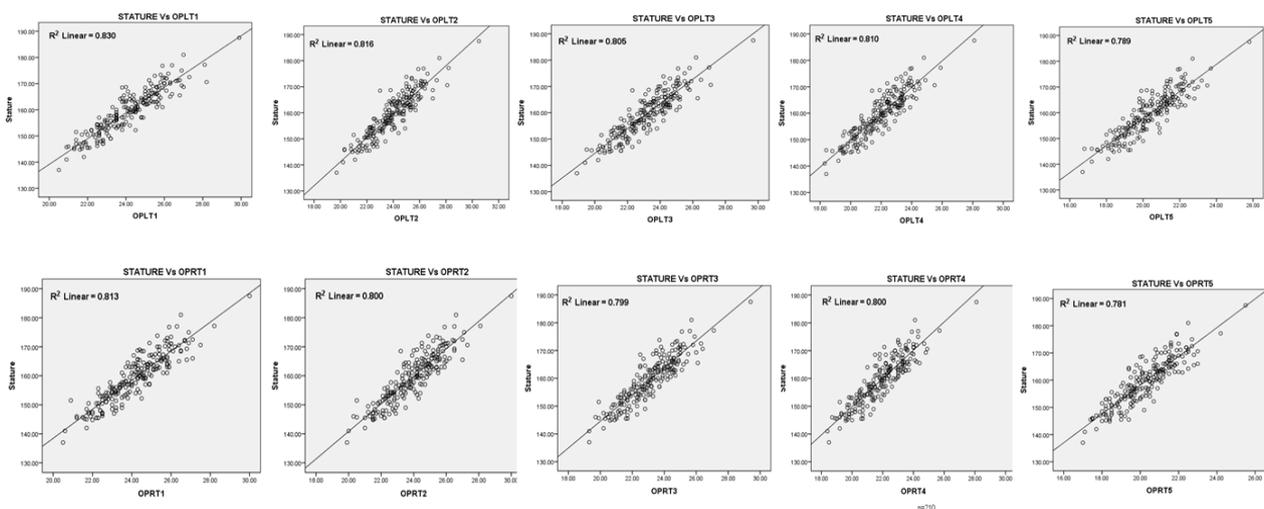


Figure 3: Illustrative example of scatter graphs showing the relationship between various foot outline lengths and stature in pooled sample of Malanau ethnics in east Malaysia (N=210).

CONCLUSION

The result of this investigation provided regression equations for stature estimation from foot outline (complete or partial) measurements in Melanaus of East Malaysia in northern Borneo Island. The regression equation derived for the pooled sample can be employed to estimate stature when the sex of the perpetrator remains unknown, as in real crime scenarios. It is important to note that the people from different races and regions of Malaysia bear different morphological features depending upon their geographical distribution and primary racial characteristics and a single formula cannot represent all parts of the country. It would be incorrect to utilize the equations to estimate stature from foot outline measurements derived for Melanaus to any other populations either in Malaysia or any other populations in the world. Hence it is suggested that similar studies should be continued on other ethnic groups living in different parts of the world so that effect of genetic and environment can be investigated in forensic terms.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

ACKNOWLEDGMENT

The authors are thankful to all participants who took part in this strenuous study. Thanks are due to Sarawak state Chief Minister, Sarawak state Police Chief, Forensic Police Investigating Officers and Chemistry Department of Malaysia, Bintulu Branch, East Malaysia for their support to conduct this research. Authors are grateful to Universiti Sains Malaysia for encouraging research and its publication in international journals.

REFERENCES

1. Jahar JK, Vijay P, Paliwal PK. Estimation of height from measurements of foot length in Haryana region. *Journal of Indian Academy of Forensic Medicine* 2010; **32**:231–233.
2. Philip TA. Formulae for establishing stature from foot size by regression method. *Journal of Indian Academy of Forensic Medicine* 1990; **12**:57–62.
3. Krishan K. Individualizing characteristics of footprints in Gujjars of north India—forensic aspects. *Forensic Science International* 2007; **169**:137–144.
4. Nataraja Moorthy T, Mazidah K, Hadzri M, Jayaprakash PT. Estimation of stature based on foot length of Malays in Malaysia. *Australian Journal of Forensic Sciences* 2011; **43**:13–26.
5. Ilayperuma I, Nanayakkara BG, Palahepitiya KN. A model for reconstruction of personal stature based on the measurements of foot length. *Galle Medical Journal* 2008; **13**(1): 6-9
6. Petra U, Radoslav B, Sona M. Stature estimation from various foot dimensions among Slovak population. *Journal of Forensic Sciences* 2013; **58**(2): 448-451.
7. Mansur DI, Haque MK, Sharma K, Karki RK, Khanal K, Karna R. Estimation of Stature from Foot Length in Adult Nepalese Population and its Clinical Relevance. *Kathmandu University Medical Journal* 2012; **37**(1):16-9.
8. Ogugua E, Nto NJ, Bello EF, Egwu EO, Ukoha UU, Ajah D. Stature Estimation from Foot Dimensions of an Adult Nigerian Population. *Anatomica Karnataka* 2012; **6**(2):08-12.
9. Sonali K, Ashias A. Estimation of stature from the measurement of foot length, hand length and head length in Maharashtra region. *Indian Journal of Basic & Applied Medical Research* 2012; **1**(2): 77-85.
10. Salina H, Mamat S, Che R, Ibrahim, Mohamad A. Regression analysis for stature estimation from foot anthropometry in Malaysian Chinese. *Australian Journal of Forensic Sciences* 2012; **44** (4): 333-341.
11. Pradeep KP, Abhilasha D. Study of correlation between human height and foot length in residents of Mumbai. *International Journal of Biological and Medical Research* 2012; **3**(3): 2072 -2075.
12. Robbins LM. Estimating height and weight from size of footprints. *Journal of Forensic Sciences* 1986; **31**:143–52.
13. Kennedy RB, Chen S, Pressman IS, Yamashita AB, Pressman AE. A large scale statistical analysis of bare foot impressions. *Journal of Forensic Sciences* 2005; **50**:1071–1080
14. Irene Atef Fawzy,1 M.D. and Nashwa Nabil Kamal,2 M.D. Stature and Body Weight Estimation from Various Footprint Measurements Among Egyptian Population. *Journal of Forensic Sciences* 2010; **55**(4): 884-888

15. Reel S, Rouse S, Vernon W, Doherty D. Estimation of stature from static and dynamic footprints. *Forensic Science International* 2012; **219**: 283.e1–283.e5.
16. Naomi H, Ambika F, Nur-Intaniah I, Daniel F, Tytuł A. Estimation of stature using anthropometry of feet and footprints in a Western Australian population. *Journal of Forensic and Legal Medicine* 2013; **20**(5): 435-441.
17. Nataraja Moorthy T, Nurul A, Hairun Nisa M. Stature estimation based on footprint measurements of Malays in Peninsula Malaysia by regression analysis. *International Journal of Biomedical and Advance Research* 2013; **4**(10):683-689.
18. Nataraja Moorthy T, Mustaqqim A, Boominathan R, Raman N. Stature estimation from footprint measurements in Indian Tamils by regression analysis. *Egyptian J Forensic Sci* 2013; In press, Available online 5 December 2013.
19. Robbins LM. The individuality of human footprints. *Journal of forensic sciences* 1978; **23**(4): 778-785.
20. Krishan K. Estimation of stature from footprint and foot outline dimensions in Gujjars of North India. *Forensic Science International* 2008; **175**: 93-101.
21. Nataraja Moorthy T, Ang YL, Saufee AS. Estimation of stature from footprint and foot outline measurements in Malaysian Chinese, *Australian Journal of Forensic Sciences* 2013; Doi.org/10.1080/00450618.2013.825813: e1-e24 .
22. Hairunnisa MAK, Nataraja Moorthy T. Estimation of stature from foot outline measurements in Ibans of East Malaysia by regression analysis. *International Journal of Biomedical And Advance Research* 2013; **04** (12): 1-7.
23. Whitehouse RH, Tanner JM, Healy MJ. Diurnal variation in stature and sitting height in 12–14-year-old boys. *Annals of Human Biology* 1974; **1**:103–6.
24. Krishan K, Vij K. Diurnal variation of stature in three adults and one child. *Anthropologist* 2007; **9**:113–117.
25. Krishan K, Kanchan T, Sharma A. Multiplication factor versus regression analysis in stature estimation from hand and foot dimensions. *Journal of Forensic and Legal Medicine* 2012; **19**:211–214.
26. Kanchan T, Krishan K, Shyamsundar S, Aparna KR, Jaiswal S, Analysis of footprint and its parts for stature estimation in Indian population. *The Foot* 2012; **22** (3): 175–180.
27. Robbins LM. *Footprints-collection, analysis and interpretation*, Charles C, Thomas, Spring Field, IL, USA, 1985.
28. Krishan K, Abihilasha S. Estimation of stature from dimension of hand, feet in north Indian population. *Journal of Forensic and Legal Medicine* 2007;**14**:327–332.
29. Anderson M, Bias M, Green WT. Growth of the normal foot during childhood and adolescence-length of the foot and interrelations of foot, stature and lower extremity as seen in serial records of children between 1–18 years of age. *American Journal of Physical Anthropology* 1956;**14**:287–308.
30. Blais MM, Green WT, Anderson M. Lengths of the growing foot. *Journal of Bone and Joint Surgery* 1956;**38**:998–1000.
31. Roche AF, Davila GH. Late adolescent growth in stature. *Pediatrics* 1972;**50**:874–880.
32. Nagesh Kumar G, Kotian MS. Footprint ratio (FPR) – a clue for establishing sex identity. *Journal of Indian Academy of Forensic Medicine* 1990;**12**:51–56.

AN UNUSUAL CASE OF INFANTICIDE BY INTERNAL COMPRESSION OF AIRWAYS - A CASE REPORT -

Rohan Ruwanpura¹, Sriyantha Amararatne² & Kumudu Dhahanayake²

¹Consultant Judicial Medical Officer, Teaching Hospital, Karapitiya, Galle, Sri Lanka

²Registrar in Forensic Medicine

ABSTRACT

In Sri Lanka, as in many other jurisdictions, infanticide refers to killing of a newborn below 12 months in age, by his biological mother. Methods used in infant homicides range in a vast spectrum, including acts of omissions, asphyxia, poisoning, drowning, suffocation, and sharp and blunt force injuries etc. Internal examination revealed a “Suraya” [a cylindrical metallic object around 1cm in diameter and 5cm in length, which is used as a protective agent from evil omens] passed into the mid third of the oesophagus. The cause of death is attributed to compression of respiratory tracts due to foreign body in the oesophagus. The mother of the infant is a known psychiatric patient since six months prior to the incident.

INTRODUCTION

Infanticide is one of the rarer, but well known, oldest medico legal entities heard from all parts of the world^{1,2}. As in many jurisdictions, infanticide in Sri Lanka refers to killing of a newborn below 12 months in age. The infant killing by the mother is exempted from culpable homicide amounting to murder by provisions in the criminal laws of Sri Lanka³. Methods used in infant homicides range in a vast spectrum, including acts of omissions, asphyxia, poisoning, drowning, suffocation, and sharp and blunt force injuries etc. The present case is about infanticide due to compression of the respiratory passages by passing metallic object into the oesophagus by a mentally subnormal mother.

Case history

A body of a female infant, two months in age, was referred to the medico legal unit of the

Karapitiya Teaching Hospital after unsuccessful resuscitation attempts of artificial ventilation and cardiac stimulation at the emergency therapy unit. According to grandmother of the victim, the incident took place at their residence, around the mid night. While approaching child's bedroom in response to abnormal gurgling noise, she noticed that the victim was lying on its back on the bed, markedly bluish and dyspnoeic. The mother of the infant gave no detailed explanation to what has happened, but stated that both herself and her child were attacked by an evil spirit. She is a known psychiatric patient since last six months prior to the incident, but she rapidly recovered in response to treatment with antipsychotic drugs and rational until childbirth and her condition was again deteriorating during past two weeks. The relatives were under the impression that recurrence of her illness is due to influence of the evil spirit of her husband's father who died around the said period⁴. They have approached an indigenous spiritual healer who provided them with protective “Suyraya” [thailsmans] for both mother and the child.

Autopsy

The body was that of an infant of 8 weeks in age and of good nourishment, 64 cm in length, 2800g in weight. There were no external injuries; finger tips showed marked cyanosis and no subconjunctival or mucosal petechial haemorrhages were noted. Internal examination revealed a “Thalisman” [cylindrical metallic object around 1 cm in diameter and 5 cm in length, which is used as a protective agent against harmful evils] passed into mid third of the oesophagus. The mucosal tissues in the throat region were slightly eroded and swollen. The foreign object was situated beneath the bifurcation of trachea which was compressed. A

small amount of emulciated milk was present in the stomach. A few subepicardial and subpleural petechial haemorrhages with bilateral pulmonary oedema were noted. All other organs were unremarkable. The cause of death is attributed to compression of respiratory passages due to foreign body in the oesophagus.

DISCUSSION

The infanticide is rare but considered being a serious crime, which shows a decreasing trend in developed countries⁵. Killing of an infant is not a difficult task which can be performed even by a trivial act of omission or commission. It appears that, the most likely intention of the assailant was to obstruct the airways by passing foreign body into the larynx, but it has slipped into the oesophageal opening probably due to action of the epiglottis and concave of posterior wall of the mouth. Although passing a small foreign object through oesophagus is not always fatal, the length and stiffness of the object like "Suraya", causes it to be stuck at the level of tracheal bifurcation, applying pressure on the respiratory passages^{6,7}. The compression tracheo-oesophageal membrane causes mechanical obstruction of the airways as well as sudden cardiac inhibition due to stimulation of parasympathetic receptors. Cardiac inhibition⁸ is the most frequent mode of death in gagging and choking⁹.

According to Adelson, the infanticide must be proven beyond possible rather reasonable doubt. It is obvious in this case that an accidental swallowing of a foreign body by two months old infant is impossible. In fact, aspirations and ingestion of foreign bodies are noted in young children who were likely victims of physical child abuse¹⁰. The exclusion of sudden infant death¹¹ is an essential proof needed in all cases of infant deaths and, therefore, all infant deaths require in thorough autopsy examination with application of special dissecting techniques¹². However, autopsy findings of this case are self explanatory and exclusive of any natural or unforeseen event.

Infanticide is often associated with an acute and a chronic structured psychiatric conditions such as puerperal psychosis, maniac-depressive

psychosis, schizophrenia, epilepsy, substance abuse, etc. Sometimes, it is connected to socio-cultural constraints and confusions of adaptation of the postpartum stage¹³. The presence of genetic determinants in potential cases of maternal infanticide has already been confirmed¹⁴. An assailant of this case is a known psychiatric patient, who was apparently mismanaged by the relatives during her perinatal period. Approaching native healers in management of psychiatric patients, especially in post partum psychosis, is still heard from time to time in rural areas of Sri Lanka¹⁵. As majority cases are of a mild nature, psychiatric symptoms of which may disappear with the time without any treatment, the credit of cure goes to the native healers, convincing more and more people to obtain their services. Majority medical and legal experts support the position that a woman with postpartum psychosis who commits infanticide needs treatment rather than punishment and that appropriate treatment will deter her from killing again¹⁶.

CONCLUSIONS

The clinico-pathological aspects of an uncommon case of infanticide are discussed. The danger of avoiding or delaying in treatment of post-partum psychosis is highlighted by quoting relevant literature sources.



Fig 1: An oesophagus is cut open to show foreign bogy in mid third.

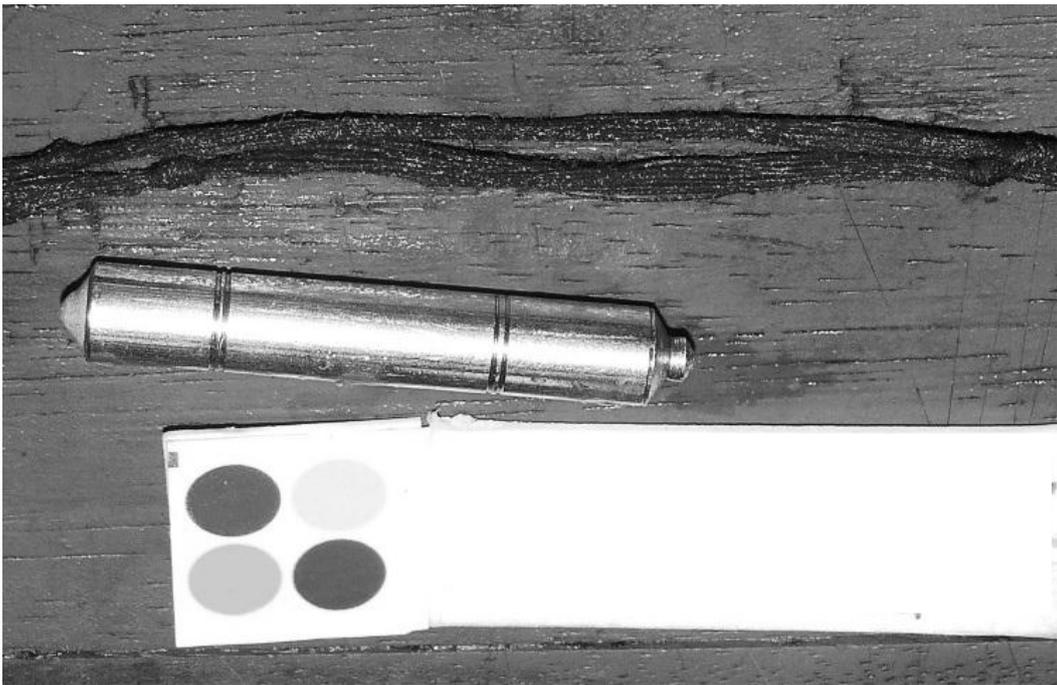


Fig 2: A "Suraya" [Thalisman] with a cotton string.

REFERENCES

1. Trautmann-Villalba P, Hornstein C. Children murdered by their mothers in the postpartum period *Nervenarzt*. 2007;78(11):1290-5.
2. Kociumbas J. *Gend Hist*. Azaria's antecedents: stereotyping infanticide in late nineteenth-century Australia. 2001;13(1):138-60.
3. Penal code section 383 – a. 1995; Parliament of Sri Lanka.
4. Castillo RJ. Spirit possession in South Asia, dissociation or hysteria? Part 2: Case histories *Culture, Medicine and Psychiatry* 1994(18);2:141-21.
5. Christiansen S, Rollmann D, Leth PM, Thomsen JL. Children as victims of homicide 1972-2005. *Ugeskr Laeger*. 2007;169(47):4070-4.
6. Chen X, Milkovich S, Stool D, van As AB, Reilly J, Rider G. Pediatric coin ingestion and aspiration. *Int J Pediatr Otorhinolaryngol*. 2006;70(2):325-9.
7. Rider G, Wilson CL. Small parts aspiration, ingestion, and choking in small children: findings of the small parts research project. *Risk Anal*. 1996;16(3):321-30.
8. Villain E. cardiac syncope in children. *Arch Pediatr*. 2004;11(2):169-74.
9. Baker SP, Fisher RS. Childhood asphyxiation by choking or suffocation. *JAMA*. 1980;244(12):1343-6.
10. Krugman SD, Lantz PE, Sinal S, De Jong AR, Coffman K. Forced suffocation of infants with baby wipes: a previously undescribed form of child abuse. *Child Abuse Negl*. 2007 Jun;31(6):615-21.
11. Hässler F, Zamorski H, Weirich S. The problem of differentiating between sudden infant death syndrome, fatal Munchausen's syndrome by proxy, and infanticide *Z Kinder Jugendpsychiatr Psychother*. 2007;35(4):237-44; quiz 245-6.
12. Dufková J. Autopsy technique and basic legal aspects of autopsy *Beitr Gerichtl Med*. 1990;48:93-101.
13. Rammouz I, Tahiri DA, Aalouane R, Kjjiri S, Belhous A, Ktiouet JE, Sekkat FZ. Encephale. Infanticide in the postpartum period: about a clinical case. 2008;34(3):284-288.
14. Quilter CR, Gilbert CL, Oliver GL, Jafer O, Furlong RA, Blott SC, Wilson AE, Sargent CA, Mileham A, Affara NA. Gene expression profiling in porcine maternal infanticide: A model for puerperal psychosis. *Am J Med Genet B Neuropsychiatr Genet*. 2008 Mar 24. [Epub ahead of print]
15. Amarasingham LR. Movement among healers in Sri Lanka: A case study of a sinhalese patient. *Culture, Medicine and Psychiatry* 1980 (4);1:71-20.
16. Spinelli MG. Maternal infanticide associated with mental illness: prevention and the promise of saved lives. *Am J Psychiatry* 2004;161(9):1548-57.

INSTRUCTIONS TO AUTHORS

Sri Lanka Journal of Forensic Medicine, Science & Law publishes original papers, reviews, points of view, case reports, and letters to the editor, in all fields of Forensic Medicine, Forensic Sciences & relevant Law & Ethics.

Material received is assumed to be submitted exclusively to the journal. All papers will be peer reviewed. The editors reserve the right to amend style and shorten articles where necessary, and determine priority and time of publication. When submitting papers, authors are advised to keep copies of the manuscripts and to include a covering letter in which all authors have consented for the publication of the article in the Sri Lanka Journal of Medicine, Science and Law.

MANUSCRIPTS

Two copies of the manuscript, including figures and tables, should be submitted to the editor: Dr. Induwara Gooneratne, Editor, Dept. of Forensic Medicine, Faculty of Medicine, University of Peradeniya. The paper should be typewritten in double spacing on one side of A4 paper. All pages should be numbered. Papers should be divided into the following sections, each of which should begin on a separate page: Title Page, Summary, Text, Acknowledgements, References, Tables, Figures and Legends.

ELECTRONIC MANUSCRIPTS

If accepted for publication the authors will be requested to submit an electronic manuscript on a CD in "word" format and an exactly matching printout. Please specify the word processing package used, in the covering letter.

The title page should give the full title, names of authors with qualifications, posts held during the study, department(s) and institution(s) where the work was carried out, and the name and full address (including telephone number, emails) of the author for correspondence.

The summary should not exceed 250 words and should set out what was done, the main findings and conclusions. Upto five **Key words** should be given under the Summary.

The text of full papers should be divided into Introduction, Materials and Methods, Results, and Discussion. Only generic names of drugs should be given. Abbreviations should be spelt out when first used in the text. Scientific measurements should be given in SI units. Statistical methods should be specified in the Methods section and any which are not in common usage should be referenced.

Tables and figures should be referred to in the order of appearance in the text in Arabic numerals within parentheses, e.g. (Fig. 1). Tables with brief titles should be typed on separate pages. Figures should be used only when data cannot be expressed clearly in any other form. They should not be mounted. Line drawings should be in Indian ink on heavy white paper or card. Photographs should be glossy prints, and the reverse should give the figure number, title of paper, principal author's name and have a mark indicating the top. The cost of reproducing photographs and illustrations may be charged to the author.

References should be in the Vancouver style, and numbered consecutively using Arabic numerals within parentheses in the order in which they appear in the text. Reference to journal articles should give name(s) of the author(s), title of the article, title of the journal.

Note that this journal requires the complete name of the journal and not its abbreviation. References from books and monographs should include name(s) of the author(s), title of book, edition, place of publication, publisher's name and year of publication. e.g.

Journal article: 1. Khong TY, Healy DL, McCloud PI. Pregnancies complicated by abnormally adherent placenta and sex ratio at birth. *British Medical Journal* 1991;302:625-6.

Book: 2. Sherlock S. *Diseases of the liver & biliary system.* Oxford: Oxford University Press, 1985.

Article in book: 3. Blumgart LH. Benign biliary strictures. In: Tandon BN, Nayak NC, Nundy S, eds. *Advances in liver diseases.* Delhi: Macmillan India Ltd, 1989:164-82.

Articles accepted for publication but not yet published can be included as references followed by '(in press)'. Using abstracts as references should be avoided. 'Unpublished data' and 'personal communications' should not be used as references, but may be mentioned as such in the text within parentheses.

Reprints of articles will be supplied at cost. Details will be sent to authors with the proofs. Inquiries regarding **advertisements & subscription** should be addressed to, Dr. Induwara Gooneratne, Editor, Dept. of Forensic Medicine Faculty of Medicine, University of Peradeniya Sri Lanka. Individual copies of the Journal are available at Rs.350/- each. All cheques and drafts should be drawn in favour of the 'Sri Lanka Journal of Forensic Medicine, Science & Law, Dept. of Forensic Medicine, Faculty of Medicine.

A soft copy of your article has to be sent to the Editor. E-mail: induwarag@yahoo.com.