

ORIGINAL RESEARCH

A Population-based Study on the Prevalence of Impairment and Disability Among Young Cambodian Children

Peter Evans¹, Shaheen Shah², Adam Huebner³, Selvaraj Sivasubramaniam⁴,
Chhoeurn Vuthy⁵, Kao Sambath⁶, Lucy Haurisa⁷, Yim Borun⁸

1. Consultant in Special Education, UK

2. Paediatric Ophthalmologist, Brisbane, Australia

3. Health Coordinator, Handicap International, Cambodia

4. Lecturer in Medical Sciences, University of Aberdeen, UK

5. Head of Paediatric Surgery Department, National Paediatric Hospital, Cambodia

6. Chief of Service, Centre for Child and Adolescent Mental Health, Cambodia

7. ENT Specialist, WHO Western Pacific Region, Philippines

8. Head of Eye Department, Kampot Hospital, Cambodia

ABSTRACT

Purpose: *This population-based study aimed to estimate the prevalence of impairment and disability and associated risk factors among children between 2 – 9 years of age in Cambodia.*

Method: *A two-phase method was employed. In phase 1, children were screened using the Ten Question Screening Instrument (TQSI) developed for the World Health Organisation (WHO). Those identified positive, were then referred to phase 2 for a detailed multi-professional assessment. A further 10% of children pre-selected at random were also referred to phase 2. Treatment needs for children with disability and risk factors for their disability were also determined.*

Results: *Prevalence of impairment was estimated at 15.59% (95% CI: 15.05, 16.14), disability at 10.06% (95% CI: 9.16, 10.1) and moderate/severe/profound at 3.22% (95% CI: 2.96, 3.49). Cognition (5.48%. 95% CI: 5.15, 5.83), speech (motor) (2.05%. 95% CI: 1.85, 2.27), speech (language) (1.80%. 95% CI: 1.61, 2.01) and hearing (2.51%. 95% CI: 2.29, 2.76) were the most common disabilities. History of difficult delivery, child's age, major injury, gender and large family size were significant predictors of disability. Analysis of 'false negatives' in the validation group suggested that many parents and caretakers were unaware of their child's disability.*

Treatment needs were found to be very high, approaching 100% for children with moderate or worse disabilities.

* **Corresponding Author:** Professor Peter Evans, Consultant in Special Education, UK. Email:plcevans@hotmail.com

Conclusions: *Prevalence estimates based on this study are more than 10 times higher than those reported in Cambodia's 2008 National Census. The identified risk factors imply the need for substantial expansion of obstetric services. Education and awareness of disabilities in the population and strategies to prevent injuries require more government attention.*

Limitations: *The main limitation was the relatively low response rate in phase 2, following referral from phase 1, despite efforts made to encourage attendance. This issue would need to be addressed in future work.*

Key words: *two-phase procedure, risk factors, treatment needs, education and health services.*

INTRODUCTION

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD, 2008) requires countries to report statistical data about their children with disabilities for planning purposes. Such data is, for instance, essential for developing inclusive education which is another requirement of the UNCRPD. However, credible statistical data is not available for many low and middle income countries, and even though this issue has been a lasting concern for both the UNCRPD and the World Health Organisation (WHO, 2007), it remains difficult to persuade governments and donors to invest adequately in this sector.

Cambodia is a low to middle income country with a population of approximately 13 million people, of whom just over a third are under 15 years of age (Kingdom of Cambodia, National Census, 2008). In Cambodia, as in many countries at a similar stage of development, disability is largely ignored by society and inclusive education is not prioritised. For example, the percentage of children with disabilities from 0-17 years of age, as determined through self reporting during the Cambodia National Census of 2008, was less than 1% (0.81%). This estimate is substantially lower than what is available in both developed and other developing countries. One reason for this may be due to a lack of awareness about what constitutes an impairment or disability among the general population. The Organisation for Economic Cooperation and Development (OECD, 2007) gives a median percentage for 15 developed countries of 2.63% for children with organic disabilities of compulsory school age, and data from developing countries, e.g. Jamaica at 2.5% (Thorburn et al, 1992) and Pakistan at 4.4% (Durkin et al, 1995) and Kenya at 6.1% (Mung'ala-Odera et al, 2006), all show estimates substantially higher than 1%.

However, important developments indicate that attitudes in Cambodia are changing. In 2009, the Government of Cambodia signed the Law on the Protection and the Promotion of the Rights of Persons with Disabilities, and also approved the Policy and Master Plan of the Ministry of Education, Youth and Sports (MoEYS) on Education of Children with Disabilities (Education for Children with Disabilities, 2008). The Policy and Master Plan are aligned with the six dimensions of the Child Friendly School Policy (UNICEF, 2012) with the main goal to ensure access to equitable and quality inclusive education.

With this in mind, the MoEYS initiated a national prevalence study to obtain a more reliable estimate of the prevalence of young children with different types of disability. A distinction is made between children with impairments and those with disabilities whose condition is likely to have a long-term impact on their social inclusion. In this context, the data serves as the basis for planning the expansion of public education in Cambodia to accommodate them. The data would also allow for evidence-based planning of other necessary support services for children with disabilities and their families.

METHOD

This population-based, cross-sectional national prevalence study was conducted between 2011 and 2012.

Sampling

Stratified, probability proportional to size sampling was used to select the sample for this study. Out of 24 provinces in Cambodia, 7 provinces (Battambang, Kampong Cham, Kampot, Phnom Penh, Preah Vihear, Rattanakiri and Siem Reap) were chosen to be representative of the country as a whole, based on urban/rural distribution, economic standing (rich/poor) and representation of ethnic minorities. According to the Kingdom of Cambodia National Census (2008), these 7 provinces form 43.56% of the total population. Subsequently, 3 districts within each of these provinces were chosen at random, using random number tables. Three communes (the largest, the smallest and an average-sized one) were selected within each district. After a random start within the villages making up the commune, trained enumerators conducted a door-to-door enumeration with every third household being included. All children between 2-9 years of age within the selected households were included, until the pre-determined target sample size was reached for each commune.

Procedure and Assessment Instruments

Phase 1

In phase 1, children between 2-9 years of age were screened at home, using the 12-question version of the Ten Question Screening Instrument (TQSI) as developed for use in Bangladesh (Durkin et al, 2000) though originally developed for the WHO (Thorburn et al, 1992). In preparation for this study, the TQSI was translated into Khmer and then back translated to ensure accuracy.

The 12 TQSI questions were read aloud to the parent or caretaker of the child by local primary school teachers, and the responses were recorded. The teachers in each commune were specially trained for this purpose on issues of disability and how to interview parents and complete the form. Children identified as positive on the TQSI, the “general group”, were referred for phase 2.

During the interview, data was also gathered on aspects of the household, such as the size of the family, whether they speak Khmer at home and whether the family was officially recognised as being poor through the possession of a government issued ‘poor card’. Eligibility for a ‘poor card’ is determined by a complex procedure at commune level. It takes into account the family’s assets, the dependency ratio, school attendance, crises or shocks, and household composition (Implementation Manual on the Procedures for Identification of Poor Households, 2008).

A random 10% of the TQSI forms were marked to identify those children who would form the “validation group” and who would be referred to the second phase independently of the screening result.

Phase 2

Children who screened positive on the TQSI were referred for a multi-professional assessment in local health centres or referral hospitals within 2 weeks of the phase 1 screening. During the preparation for this study, the original version of the data recording form (entitled the Medical Assessment Form or MAF) (e.g. Durkin et al, 2000) was translated and then reviewed by in-country physicians and specialists who amended, expanded and adapted the instrument for the Cambodian situation. Substantial amendments were required, especially in the cognitive components, so that instruments used for psychological assessments in Cambodia could be included. The new form was then back translated, keeping both English and Khmer languages in a single document and renamed “The Multiprofessional Assessment Form”..

In phase 2, the assessment team was composed of nurses and physicians, as well as vision, hearing and cognitive/behavioural/speech specialists. All the children were first registered by nurses who recorded each one's name, age, family information and anthropometrics. Children then met a physician who recorded each child's medical history, observed the child during functional exercises, conducted a physical examination and gathered information about the mother's health. After this, children proceeded for the eye examination and vision assessment. The ability to track objects was assessed for children between 2-5 years of age, while HOVT charts were used for children in the 6-9 year age group. This was followed by the ear examination and hearing assessment with a field audiometer and a field oto-acoustic emission measuring instrument. Finally, an assessment of neurological function was done, one for behaviour and one for speech and language. Psychological assessment included an assessment of milestones attained, mental retardation, autism and ADHD. At the end of the process, treatment needs were identified by the multi-professional team. These were classified as: none; assistive devices; medical; individual education plan with family support; or any combination of these items. Where necessary, a referral specialist helped arrange the appropriate referral, e.g. for hearing assessment and logistics with the family. A post-assessment interview with parents was also carried out, mainly to determine why families did not attend the phase 2 assessment.

The screening physicians and specialists who conducted the research received 1 week of intensive training on the MAF, screening process and protocols. The MAF gathered information on 351 variables. The summary of the MAF classified each child by type of impairment and disability - such as gross motor, fine motor, seizures/epilepsy, vision, hearing, behaviour, cognition, speech (motor), speech (language) and others - and by severity (mild, moderate or severe/profound) based on the International Classification of Impairments, Disabilities and Handicaps or ICDH (WHO, 1980) and the 1987 procedure manual. Impairment (without disability) was defined as an abnormality or limitation in structure but one which was temporary (e.g. severe cut on hand), easily treatable/reversible (e.g. impacted ear wax, early detected infection of ear/eye) or which did not affect the child's functioning (one leg slightly longer than the other) compared to other children of similar age. Disability was defined as an impairment which permanently affected a child's ability to function at the same level as his/her peers. Therefore, all disabilities were also impairments but not all impairments were disabilities. A full account of the procedure is given in a manual prepared by the senior author (Evans, 2012).

Prior to the study, a pilot project was conducted in early 2011 focussing on the utility of the assessment forms, the logistics necessary for sampling and child assessment, as well as the development of the necessary screening tools. Of the 577 children who were screened as part of phase 1, 142 were referred and presented for the medical assessment.

Sample Size

Mung'ala-Odera and colleagues (2004) worked with a sample size of 10,000 children in the age group of 6-9 years, which was assumed to be equivalent to a sample of 20,000 children between 2-9 years of age. If a prevalence of impairment in the population of 15% is assumed with relative precision of 10% and 95% confidence (95% CI 13.5, 16.5), a sample of size 2,175 would be required. This figure requires an adjustment for a design effect of 1.75 to account for cluster sampling design, leading to a sample of 3810 children to be examined in phase 2. Findings from the pilot study suggested an approximate referral from phase 1 to phase 2 of 20%, therefore requiring a screen of 19,050 children in the first phase which is close to the estimate based on the study of Mung'ala-Odera et al (2004). In the present study, a total of 19,046 children were screened in the first phase. With a referral rate of 21% among those screened in the first phase, the final sample size achieved was 3,997 children.

Ethical Considerations and Informed Consent

The research proposal and methodology was submitted to and approved by Cambodia's National Institute of Public Health's Committee on Health Research Ethics. An informed consent form providing a brief overview of the purpose, the procedure, the risks, the potential benefits and confidentiality issues related to the project was developed and read aloud to parents in the waiting area of the assessment sites. A prompted option for refusal was included.

Children identified with health issues, impairments and/or disabilities were assisted in accessing services through a network of public and private hospitals, as well as services provided by non-governmental organisations.

Data Entry and Analysis

Data entry for phase 1 was carried out by representatives of the Department of Planning in the Ministry of Education in provincial and district offices and in the capital city, Phnom Penh. Data were entered into SPSS files and cleaned by MoEYS employees.

Data entry for phase 2 was completed by 2 dedicated operators. All data was double-entered into SPSS files and discrepancies were adjusted by referring to the hardcopy documents.

TQSI and household databases from phase 1 and subsequent MAF data from the 7 provinces were transferred into the statistical analysis package Stata 11 using Stat/Transfer 8 for analysis.

A unique ID number was created for each child by joining the province, district, commune, household and child number variables. Duplicate and mismatching records in the TQSI and the medical assessment databases were identified and cleaned by either looking at the hardcopy originals or by deleting at random when the former was unavailable. The TQSI and MAF datasets were then merged initially by province (using the link variable ID number) and then into one main dataset for analysis. The final dataset was checked for outliers and data entry errors using multivariate outlier detection methods. Inconsistencies were identified by cross-tabulating the relevant variables. Missing values were either recoded as 'unknown' or completed if the information for that field could be found elsewhere in the dataset. Outliers in the important variables, once identified and cross-checked, were queried against the hardcopy entries as required. Multiple variables coding the same information were found and inconsistencies within these variables rectified.

Continuous variables were examined for normality and accordingly means (SD) or medians (IQR) were reported. Chi-square tests (for categorical data) and Mann Whitney tests (for ordinal data) were used to investigate differences in demographic variables. For determination of prevalence two-phase survey methods require appropriate methods (see below).

For the medically examined children, the number of impairments and disabilities observed overall and in each category were recorded. Prevalence was calculated taking into account the 2-stage methodology. To account for the fact that there were children who passed the TQSI questionnaire but on the medical assessment were found to have an impairment/disability (i.e. false negatives), the Shrout and Newman (1989) method of prevalence estimation was used. The negative predictive rate was calculated from the validation group and 1 negative predictive rate applied to the general group. To take account for the fact that not all children who were TQSI positive attended the medical assessment (i.e. the non-responders), the prevalence was adjusted according to the positive predictive

value of TQSI (also determined from the validation group). In order to make these adjustments as accurate as possible, the adjustment factors were stratified (by the type and severity of disability) by negative and positive predictive rates (to account for differences; for example, the sensitivity of TQSI to detect abnormality is likely to be higher for a severe disability compared to a mild one) (Zaman et al, 1990).

Risk factor analysis utilised logistic regression and odds ratios (OR) with 95% confidence intervals (95% CI). Univariate exploratory analysis was first conducted and then a multivariable analysis to adjust for potential confounding was performed. All possible risk factors at significance level 0.2 or below in the univariate analyses were included in the multivariate analysis (modified forward stepwise probability method).

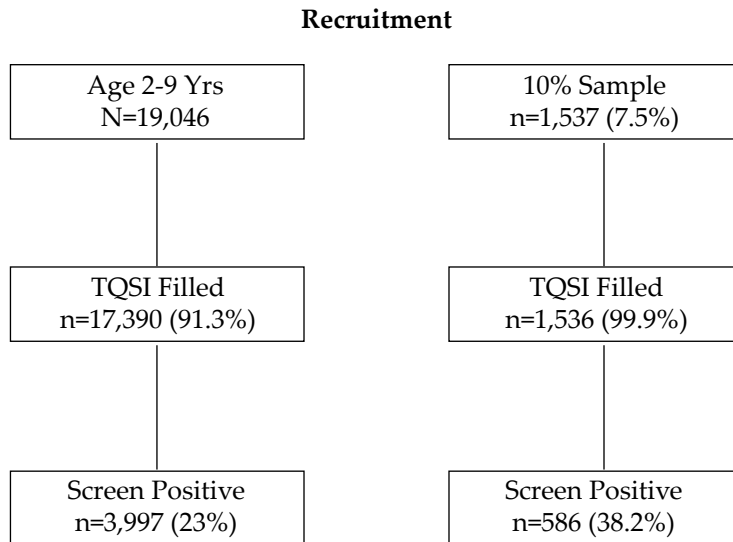
The analysis of risk factors was conducted for children with disability, and risks were compared against a group of children without impairment or disability. This group of children without impairment or disability was identified within the validation group, and consisted of children who were TQSI negative and MAF negative.

The Wald F-test was used to assess the pair-wise interactions between model variables in the multiple logistic regression analyses. The design effect due to stratified cluster sampling was taken into account in the risk factor analysis to calculate the confidence intervals in the regression modelling. Here “svy” commands (Stata 11), which use linearised variance estimators based on first-order Taylor series linear approximation, were used to compute the standard errors accounting for the clustering effect arising from the sampling design. P-values < 0.05 were considered statistically significant.

RESULTS

A total of 21 districts in 7 provinces (3 districts in each province) were surveyed. Among 20,583 children between the ages of 2 and 9 years enumerated in the survey, 18,926 (92%) children were screened using the TQSI. Children of both sexes and of all ages (2-9 years) were equally well-represented in the phase 1 screening process. The general group comprised 17,390 and the validation group 1,536.

Chart 1 – Showing the Derivation of the Sample Sizes for the General Group and the Validation Group (10% Sample).



Of the general group, 23% (3,997/17,390) screened positive on the TQSI and were referred for multi-professional assessment. Of these 3,997 children, 1,860 (46.5%) attended and underwent the multi-professional assessment. Furthermore, some demographic differences were identified in those who attended the multi-professional assessment and those who did not. Children in the capital were much more likely to “no-show” than children in rural areas.

Out of the children in the general group who underwent the multi-professional assessment (n= 1,860), a total of 420 were found to have 1 or more disabilities. 174 children were found to have a disability which was classified as either ‘moderate’ or ‘severe/profound’.

The prevalence of impairment among the study population was estimated to be 15.59% (95% CI: 15.05, 16.14). Prevalence of disability was 10.06% (95% CI: 9.61, 10.51). The estimated prevalence of moderate/severe/profound disability in the study population was 3.22% (95% CI: 2.96, 3.49).

The most common impairments were hearing impairment with prevalence of 6.53% (95% CI: 6.17, 6.91), cognitive impairment with prevalence of 6.13% (95% CI: 5.78, 6.50), speech impairment (motor) with prevalence of 2.46% (95% CI:

2.23, 2.70) and speech impairment (language) with prevalence of 2.19% (95% CI: 1.98, 2.42).

For disability, cognition at 5.48% (95% CI: 5.15, 5.83), speech (motor) at 2.05% (95% CI: 1.85, 2.27), speech (language) at 1.80% (95% CI: 1.61, 2.01) and hearing at 2.51% (95% CI: 2.29, 2.76) were the most common. The estimated prevalence for all categories of disability is given in Table 1.

Table 1: Prevalence of Impairment, Disability and Moderate/Severe/Profound Disability

All Provinces (n=17,390)	Impairment				Disability				Moderate/Severe/Profound Disability			
	n	Prev	95%	CI	n	Prev	95%	CI	n	Prev	95%	CI
Gross Motor	88	1.42%	1.25%	1.61%	79	1.16%	1.00%	1.33%	48	0.66%	0.55%	0.79%
Fine Motor	69	0.85%	0.72%	1.00%	64	0.82%	0.69%	0.97%	38	0.59%	0.48%	0.71%
Seizures	68	0.81%	0.68%	0.95%	32	0.45%	0.36%	0.57%	19	0.20%	0.14%	0.27%
Vision	102	3.02%	2.77%	3.28%	64	1.53%	1.35%	1.72%	29	0.52%	0.42%	0.64%
Hearing	189	6.53%	6.17%	6.91%	82	2.51%	2.29%	2.76%	36	0.79%	0.67%	0.94%
Behaviour	29	0.95%	0.81%	1.10%	27	0.94%	0.80%	1.09%	12	0.22%	0.16%	0.31%
Cognition	255	6.13%	5.78%	6.50%	237	5.48%	5.15%	5.83%	54	1.18%	1.02%	1.35%
Speech (Motor)	143	2.46%	2.23%	2.70%	136	2.05%	1.85%	2.27%	78	1.35%	1.18%	1.53%
Speech (Language)	105	2.19%	1.98%	2.42%	101	1.80%	1.61%	2.01%	64	1.11%	0.96%	1.28%
Other	28	0.37%	0.29%	0.48%	18	0.13%	0.08%	0.20%	9	0.08%	0.04%	0.14%
Any	558	15.59%	15.05%	16.14%	420	10.06%	9.61%	10.51%	174	3.22%	2.96%	3.49%

Risk Factors

The risk factors analysis is presented in Table 2. The multivariate analysis found that the strongest associations with disability were maternal history of a difficult delivery (OR 2.57, CI 95% 1.06-6.27; $p=0.039$), the child's age (between 6-9 years had higher prevalence than 2-5 years) (OR 2.28, CI 95% 1.78-2.93; $p=0.001$) and major childhood injury (OR 1.76, CI 95% 1.76-2.29; $p=0.001$).

In addition, boys (OR 1.63, CI 95% 1.24-2.15; $p=0.002$) and children from large families (6 or more members) had increased risk of disability (OR 1.51 CI 95% 1.02-2.23; $p=0.043$).

Other 'at risk' factors that were included in the analysis, namely whether the Cambodian language (Khmer) was spoken at home, whether the family possessed a poverty card, maternal illness during pregnancy, place of birth (hospital/clinic or at home), birth parity, presence of antenatal care, immunisation and consanguinity, failed to reach statistical significance.

Based on the anthropometric data gathered during the study on children assessed in phase 2, t-tests revealed that children with disabilities had significantly lower average height-for-age ($p=0.001$) and weight-for-age ($P=0.001$) ratios compared to children without disabilities. Adjusted for age, 5.4% of children with disabilities were stunted in contrast to 2.8% of those without disabilities, and 4.6% of those with disabilities were underweight in contrast to 1.8% of those without disabilities.

Table 2: Risk factors for Disability

	Number Impairments		Disabled*		Univariate Analysis				Multivariable Analysis			
	n=477	%	n=609	%	O.R.	95%	CI	p-value	O.R.	95%	CI	p-value
Age Group												
2-5 years	251	52.6	198	32.5	1.00				1.00			
6-9 years	226	47.4	411	67.5	2.31	1.80	2.95	0.001	2.28	1.78	2.93	0.001
Gender												
Girl	235	49.3	231	37.9	1.00				1.00			
Boy	242	50.7	378	62.1	1.59	1.25	2.03	0.001	1.63	1.24	2.15	0.002
Speaks Khmer?												
No	90	18.9	76	12.5	1.00				1.00			
Yes	387	81.1	533	87.5	1.63	0.84	3.16	0.134	1.64	0.93	2.89	0.083
Poverty Card?												
No	417	87.4	492	80.8	1.00				1.00			
Yes	60	12.6	117	19.2	1.65	0.92	2.95	0.085	1.50	0.83	2.74	0.165
Family Size												
1-5	286	60.0	298	48.9	1.00				1.00			
5+	191	40.0	311	51.1	1.56	1.06	2.30	0.026	1.51	1.02	2.23	0.043
Maternal Illness during pregnancy?												
No	368	77.2	437	71.8	1.00				1.00			
Yes	109	22.9	172	28.2	1.33	0.88	2.01	0.161	1.31	0.88	1.97	0.172
Difficulty during delivery?												
No	459	97.9	577	95.1	1.00				1.00			
Yes	10	2.1	30	4.9	2.39	1.07	5.32	0.035	2.57	1.06	6.27	0.039
Has child had major injury?												
No	411	86.2	466	76.5	1.00				1.00			
Yes	66	13.8	143	23.5	1.91	1.44	2.53	0.001	1.76	1.36	2.29	0.001
Fully Immunised?												
Yes	50	10.5	43	7.1	1.00							
No	427	89.5	566	92.9	1.54	0.87	2.74	0.130				

* Note: Disabled include children with Mild/Moderate/Severe/Profound disabilities.

Treatment Needs

Treatment needs were found to be high in all children with disability. Levels approached 100% in those with moderate/severe/profound disability. For gross motor, behaviour, cognition and speech (motor and language), an education plan was most needed. For fine motor, seizures, vision and hearing, medical treatments were most needed.

DISCUSSION

This study is the most comprehensive survey of children with impairments and disabilities carried out in Cambodia, and builds on the work developed by Belmont (1984) in other middle and low income countries. Overall, 15.59% of children aged 2-9 years were estimated to have some impairment and 10.06% of children were estimated to have a disability, of which cognition was by far the most prevalent condition. The prevalence estimate for Cambodia, of 3.22% for children aged 2-9 years with moderate/severe/ profound disabilities, was similar to figures for Jamaica at 2.5% (Thorburn et al, 1992) and Pakistan at 4.4% (Durkin et al, 1995) but lower than that found in Kenya at 6.1% (Mung'ala-Odera et al, 2006).

The figures in this study raise important questions about the usefulness of data gathered by the Cambodian government during the regular national censuses. The Kingdom of Cambodia National Census (2008) found a disability estimate of less than 1% for children aged 2-17 years, well below the 10.06% prevalence identified in this research. Given that rates of disability in this study sample increased significantly with age, this would imply even greater under-reporting of disabilities in the National Census in a sample 2-17 years of age.

In terms of risk factors (see Table 2), unlike other studies in low income countries (e.g. Mung'ala-Odera et al, 2006) boys were found to be more at risk for disability than girls by a ratio of approximately 3:2, even though the presence of an impairment was almost equally divided. Further work is needed to determine the underlying reasons for this result. However, the outcome is consonant with studies in high income countries (OECD, 2007) that consistently show greater numbers of boys with disabilities than girls.

Risk factors of childhood injury and difficulties in labour being associated with disability confirm findings in other work (e.g. Mung'ala-Odera et al, 2006). Children with disabilities had, on an average, lower weight and height-per-age than children without disabilities.

The results in this study are evidence that there exists an urgent need (a) to develop improved maternal services, (b) to initiate better measures to prevent childhood injuries through, for example, legislation and education, and (c) to inform government strategies for planning services for inclusive education. Furthermore, the analysis of the data based on false negatives (determined from the validation group, i.e., a negative response in phase 1 but positive in phase 2) suggests that many parents and caretakers were unaware that their child had a disability, especially in the case of mild or moderate disabilities (e.g. low vision, partial hearing loss). This may partly explain government under-reporting. Importantly, almost all children identified with a disability needed initial or additional treatment. Very few specialty health services exist outside of the capital, Phnom Penh, and the main tourist city of Siem Reap, and in particular services in the areas of cognitive, neurological, hearing and speech disabilities are either non-existent or largely insufficient. For the services that do exist, transportation, treatment costs and associated costs (e.g. lodging, meals, etc) are often prohibitive for most families. Further consideration needs to be given to the current system of detection, referral and treatment for both children with disabilities and children with significantly delayed development. A potential way forward would be to implement the “key informant” method as developed in Bangladesh (Muhit et al, 2007). At the same time, it is likely that poverty levels will impact on the low height and weight for age of many of the children.

This research found cognitive, speech and hearing disabilities to be the most prevalent, and hence these areas within the health, social and educational services are most in need of development and capacity building.

CONCLUSION

The survey reported in this article adds additional information and provides disaggregated and risk factor data that can be used for planning and targeting high-risk groups. The prevalence of children with disabilities aged 2-9 in Cambodia is substantially higher at 10.06% than the figure of less than 1% for children aged 0-17 years based on National Census data gathered from household surveys. Without this new data, it is unlikely that the government will embark on public education programmes and the development of needed new services, and the medical conditions of the children will therefore remain paramount until social conditions become more accommodating. New policies recognising the rights of children and the current “Master Plan” for inclusive

education indicate that necessary changes are beginning to take place. The analysis of risk factors suggests that substantial investment should be made in improving obstetric services and perinatal care and preventing childhood injury. In addition, education services for these children would need to be expanded. Children with disabilities are also more likely to be stunted and underweight in contrast to those without disabilities. Further research is required to determine the cause-effect relationships of these data.

Implications and Limitations

The data from the study suggests that in Cambodia as a whole some 230, 000 children aged 2-9 years have a disability, with the majority needing treatment. In terms of prevention, it is clear from the significant risk factors that efforts should focus on safety and awareness campaigns for accidents and injuries. It is worth noting that UNICEF (2007) estimates that 20 children develop permanent disability every day in Cambodia as a result of accidents or injuries. The promotion of safe birthing at health facilities should also be prioritised.

Early detection and treatment of high risk precursors and impairments would prevent and/or mitigate a significant percentage of disabilities which prevent or limit the child's involvement and achievement in school. For instance, unhygienic conditions and unsafe cleaning practices (e.g. ear cleaning with dirty chicken feathers and playing in dirty water) are often responsible for chronic ear infections which can develop into permanent hearing loss, which may then impact on cognitive development and ipso facto educational achievement.

Additionally, this study identified that parental education about disability should be targeted. It was found that many of the parents believed that children with disabilities could not benefit or succeed in school, and some kept their children with disabilities at home from fear of bullying and/or fear of failure at school.

The strengths of this survey included the robust study and sampling methodology, rigorous team training and the use of a pilot study to refine the main study. A significant limitation was the poor attendance of children who failed at phase 1 (i.e. TQSI positive) to report for further evaluation in phase 2. This occurred despite the use of financial and logistical assistance for transportation to the phase 2 assessment sites. Failure to attend was more in the urban areas of Phnom Penh. Post-assessment interviews with parents found that "absenteeism" was due in part to the parents and caretakers not having time, misunderstandings over

scheduled timings and locations, as well as their view that the assessment was unnecessary or not beneficial. Uptake during phase 2 may have been improved by better informing caregivers of the importance and benefits of a full assessment for their child.

Subjectivity between examining physicians and specialists as to the classifications of impairment and disability, as well as the severity levels of disability (i.e., mild, moderate, severe/profound) were minimised through supervision by the Team Leader, and case-specific discussions when necessary. Additionally, case studies were discussed and definitions were presented for each of these classifications during training sessions before the research commenced.

The findings of this research provide new data for the Cambodian Government and International Development Partners for advocacy, for developing initiatives in prevention services, intervention services and inclusive education. The data seriously questions the validity of estimates gathered via Cambodia's national census procedure. Further work is required to improve data collection on impairments during future censuses. Further research is also needed in the non-studied provinces to confirm estimates given in this study, and to refine the figures via the development of local data collection arrangements in schools and health facilities in general in Cambodia.

ACKNOWLEDGEMENT

The work was supported by the Global Partnership for Education (GPE) through a grant to the Ministry of Education Youth and Sports (MoEYS) of the Government of Cambodia.

REFERENCES

- Belmont L (1984). Final report of the international pilot study of severe childhood disability. New York: Gertrude Sergievsky Center, Columbia University.
- Durkin MS, Hasan MZ, Hasan Z (1995). The ten questions screen for childhood disabilities: Its uses and limitations in Pakistan. *Journal of Epidemiology and Community Health*; 49: 431-436. <http://dx.doi.org/10.1136/jech.49.4.431> PMID:7650469 PMCID:PMC1060134.
- Durkin MS, Khan NZ, Davidson LL, Huq S, Munir S, Rasul E, Zaman SS (2000). Risk factors for mental retardation among children in Bangladesh. *American Journal of Epidemiology*; 152 (11): 1024-1033. <http://dx.doi.org/10.1093/aje/152.11.1024>. PMID:11117611.
- Education for Children with Disabilities (2008). Kingdom of Cambodia, Ministry of Education Youth and Sport, Phnom Penh.

- Evans P (2012). Manual for carrying out quantitative surveys on out of school children and those with disabilities - Cambodia.
- Kingdom of Cambodia (2008). Implementation manual on the procedures for identification of poor households. Ministry of Planning, Phnom Penh, Cambodia.
- Kingdom of Cambodia (2008). National Census 2008. Phnom Penh: Ministry of Planning.
- Muhit MA, Shah SP, Gilbert CE, Hartley SD, Foster A (2007). The key informant method: a novel means of ascertaining blind children in Bangladesh. *British Journal of Ophthalmology*; 91: 995–999. <http://dx.doi.org/10.1136/bjo.2006.108027>. PMID:17431019 PMCID:PMC1954788.
- Mung'ala-Odera V, Meehan R, Njuguna P, Mturi N, Alcock K, Newton CRJC (2006). Prevalence and risk factors of neurological disability and impairment in children living in rural Kenya. *International Journal of Epidemiology*; 35: 683–688. <http://dx.doi.org/10.1093/ije/dyl023>. PMID:16492712.
- Organisation for Economic Cooperation and Development - OECD (2007). Students with disabilities, learning difficulties and disadvantages – policies, statistics and indicators. Paris: OECD.
- Shrout PE, Newman SC (1989). Design of two-phase prevalence surveys of rare disorders. *Biometrics*; 45(2): 549–55. <http://dx.doi.org/10.2307/2531496>. PMID:2765638.
- Thorburn M, Desai P, Paul TJ, Malcolm L, Durkin M, Davidson L (1992). Identification of childhood disability in Jamaica: the 'ten questions' screen. *International Journal of Rehabilitation Research*; 15: 115–127. <http://dx.doi.org/10.1097/00004356-199206000-00003>. <http://dx.doi.org/10.1097/00004356-199209000-00013>. PMID:1388141.
- United Nations Convention on the Rights of Persons with Disabilities (2008). New York: UN.
- United Nations International Children's Emergency Fund (2007). The Cambodia accident and injury survey. New York: UNICEF.
- United Nations International Children's Emergency Fund (2012). A framework for rights-based, child-friendly schools. Available from: http://www.unicef.org/lifeskills/index_7260.html#A Framework for Rights-Based, Child-Friendly [Accessed on 1 June 2014].
- World Health Organisation (1980). International classification of impairments, disabilities and handicaps, Geneva, WHO.
- World Health Organisation (2007). The international classification of functioning, disability and health - Children and Youth (ICF-CY). Geneva: WHO.
- Zaman SS, Khan N, Islam S, Banu S, Dixit S, Shrout P, Durkin M (1990). Validity of the 'ten questions' for screening serious childhood disability: Results from Urban Bangladesh. *International Journal of Epidemiology*; 19(3): 613–620. <http://dx.doi.org/10.1093/ije/19.3.613>. PMID:2148168.