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### Summary

The incidence of epilepsy appears to be greater in resource-poor countries (RPC). The worldwide morbidity and disability attributable to epilepsy also appears to be especially greater in those communities that are the least able to accommodate it. Premature mortality is greater among people with epilepsy living in RPC with a high proportion of these deaths being directly epilepsy-related. This would suggest that many of these deaths may be readily prevented. These issues highlight the importance of, and likely exacerbate, the substantial treatment gap in epilepsy care seen in RPC. This treatment gap is not only due to a lack of means and infrastructure but also non-adherence to standard medical therapy which appears to be in part associated with the pervasive stigma of epilepsy. Addressing the epilepsy treatment gap in RPC will require new resources to improve the availability, accessibility and affordability of necessary expertise and interventions as well as educational initiatives aiming to reduce the stigma associated with epilepsy and improve awareness of this globally undertreated disease.

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**Key words:** Seizure, resource-poor settings, developing countries, treatment gap, anti-epileptic drugs

### Die Betreuung von Menschen mit Epilepsie in Drittweltländern

Epilepsie scheint in Drittweltländern häufiger aufzutreten als in Industrieländern. Die weltweite Morbidität und Behinderungen, welche auf Epilepsie zurückzuführen sind, scheinen insbesondere höher in Gegenden, wo die wenigsten Mittel zur Verfügung stehen. Auch die Mortalität bei jungen Leuten mit Epilepsie ist in Drittweltländern erhöht, wobei ein grosser Teil dieser Todesfälle direkt mit Epilepsie zu tun hat. Das

erlaubt die Vermutung, dass manche dieser Todesfälle vermeidbar gewesen wären, und zeigt auf, welche Bedeutung dem substanziellen Mangel an Behandlungsmöglichkeiten in Drittweltländern zukommt. Die Unterversorgung ist nicht nur auf zu geringe finanzielle Mittel oder Infrastruktur zurückzuführen, sondern auch auf Vorbehalte gegenüber schulmedizinischer Behandlung, die zum Teil dem weit verbreiteten Stigma, das der Epilepsie anhaftet, geschuldet zu sein scheinen. Neue Ressourcen sind erforderlich, um das Angebot, den Zugang und die Zahlbarkeit des nötigen Fachwissens und der adäquaten Massnahmen zu verbessern. Ausserdem braucht es Informationskampagnen zum Abbau von Vorurteilen gegen Epilepsie und zum besseren Verständnis dieser weltweit immer noch unterbehandelten Krankheit.

**Schlüsselwörter:** Anfälle, Ressourcenknappheit, Entwicklungsländer, Behandlungsmangel, Antiepileptika

### L'encadrement des personnes atteintes d'épilepsie dans les pays du Tiers-Monde

L'épilepsie semble être plus fréquente dans les pays du Tiers-Monde que dans les pays industrialisés. La morbidité et les handicaps attribués à l'épilepsie à l'échelle de la planète semblent plus élevés notamment dans les régions où il y a le moins de moyens. La mortalité chez les jeunes gens atteints d'épilepsie est accrue dans les pays du Tiers-Monde, sachant qu'une grande partie de ces cas de décès est directement liée à l'épilepsie. Ceci permet de supposer que certains de ces décès auraient pu être évités, et montre l'importance du manque conséquent de possibilités de traitement dans les pays du Tiers-Monde. L'insuffisance des soins est due non seulement à de faibles moyens financiers ou à un manque d'infrastructure, mais aussi à des réserves émises vis-à-vis du traitement par la médecine conventionnelle, qui semblent être dues en partie à la stigmatisation largement répandue de l'épilepsie. De

nouvelles ressources sont nécessaires pour améliorer l'accès aux connaissances spécialisées requises et aux mesures adéquates, le tout à un prix abordable. De plus, il faut des campagnes d'information pour mettre fin aux préjugés à l'égard de l'épilepsie et mieux comprendre cette maladie toujours insuffisamment traitée dans le monde entier.

**Mots clés :** crises, pénurie de ressources, pays en voie de développement, manque de traitement, antiépileptiques

### The burden of epilepsy in resource-poor countries

The incidence of epilepsy is greater in resource-poor countries (RPC). It has been estimated that it is 50.4 per 100,000 persons per year in high income countries versus 81.7 per 100,000 persons per year in low to middle income countries (i.e. RPC) [1]. There appears to be a possible difference in the lifetime prevalence of epilepsy as well, reported to be 5.8 per 1000 (4.9 for active epilepsy) in high-income countries and 15.4 per 1000 (12.7 for active epilepsy) in RPC, although methodological issues limit the comparability of these different studies [2]. Based on similar data, the World Health Organization (WHO) has estimated that at the turn of the millennium 80% of the approximately 50 million people with epilepsy worldwide lived in RPC [3]. Epilepsy was reportedly responsible for 7 million disability adjusted life years (DALYs) worldwide, roughly 0.5% of the entire global burden of disease [3, 4].

The consequences of having epilepsy also seem to be more serious in RPC. In high-income countries, the overall relative risk of death in people with epilepsy has been reported to be between 1.6 and 3.0 times greater than those without [5, 6]. This may be tentatively contrasted to one recent Kenyan population-based study which reported that the risk of premature death was 6.5 times greater among people with (i.e. a seizure within the last year) convulsive epilepsy versus those without (standardised mortality ratio=6.5; 95% CI: 5.0, 8.3) [7]. A similar study in China reported an almost five-fold increase (standardised mortality ratio=4.9; 95%CI: 4.0, 6.1) [8].

Not only does the risk of premature mortality appear to be greater among PWE in RPC, it appears that the majority of deaths are directly epilepsy-related (e.g. status epilepticus, falls, drowning) [7 - 9], in contrast to what happens in countries such as the UK [5]. These differences, if accurate suggest that many of these premature deaths in RPC may be readily prevented [10].

### The treatment gap in resource-poor countries

The treatment gap in epilepsy is generally defined as the proportion of PWE who require but do not receive treatment. This gap is almost always less than 10% in high-income countries but has been reported to be above 75% in low-income countries [11]. It is likely that there are multiple reasons for the treatment gap in RPC, the most prominent of which are the relative lack of availability (e.g. not approved for sale in a particular jurisdiction), accessibility (e.g. only located in urban centres that are difficult to travel to without sufficient transportation infrastructure) and affordability of necessary medical resources as well as the barrier to treatment that exists as a result of the enduring stigma of epilepsy. These have been summarized as the four "A"s of the epilepsy treatment gap: availability, accessibility, affordability and awareness [12].

In a bid to measure the global distribution of epilepsy-related resources, a survey of health care providers in 160 WHO member states and territories, representing 97.5% of the world's population was carried out in 2005 [13]. It was found that CT scan and electroencephalography (EEG) were available in 96% and 92% of countries in the Americas but only 67% and 78% in Southeast Asia, respectively [13]. This differential in resource availability was especially marked for more specialized investigations and interventions. Magnetic resonance imaging and long-term video-EEG monitoring were available in 100% and 80% of countries in Europe but only 21% and 26% in Africa, respectively [13]. Epilepsy surgery was available in 66% of high income countries but only 13% of low income countries [13]. Perhaps most importantly, given that epilepsy remains a clinical diagnosis and is generally managed medically, a separate 2004 WHO report found that while there is at least 1 neurologist per 100,000 inhabitants in most of Europe and North America, they found fewer than one neurologist per million inhabitants in sub-Saharan Africa and Southeast Asia, leaving a dearth of expertise to manage this sometimes complex disease [14].

Four effective AEDs, namely phenobarbital, phenytoin, carbamazepine and sodium valproate are tentatively available in almost all countries in the world [13, 15]. That said, the cost of even these older AEDs may be so high that it renders them practically unavailable, adding to the treatment gap in epilepsy. One study examining the affordability of certain AEDs in 46 RPC estimated that carbamazepine costs an amount equivalent to 2.7 to 16.2 days of wages for the lowest-paid government worker [16]. Disconcertingly, the public sector patient price for carbamazepine in these RPCs was also found to be 4.95 times higher than international reference prices (adjusted for various local factors to increase comparability between countries).

Limitations in resource availability, accessibility and affordability are only partly responsible for the large treatment gap seen in RPC. Non-adherence to pre-

scribed medical therapy is also an important barrier to standard medical provision and treatment, what has been referred to as the “secondary treatment gap” [17]. Various studies have reported adherence to AEDs in RPCs after suitable medical consultation to be as low as 32% to 38% [18, 19]. A recent systematic review identified a number of major risk factors for AED non-adherence in RPCs, two of which were holding to superstitious and cultural beliefs and adherence to traditional treatments [20].

In high-income countries, epilepsy stigma is generally informal and unspoken. In RPCs the stigma and subsequent repercussions are arguably more overt, concrete and even institutionalized [21, 22]. In a number of east Asian languages, the word for epilepsy is pejorative, referring to a type of madness [23]. In a large survey of people in southern India, 27% of respondents believed that epilepsy is a mental illness, 15% believed that it is caused by “an ancestor’s sin”, 10% would not allow their child to play with another child with epilepsy and 46% believed that PWE could not be employed [24]. This stigma may lead to social isolation and disenfranchisement (including marital and educational limitations and the associated socioeconomic repercussions), all of which appear to motivate many PWE to not seek proper medical attention or to be non-adherent to prescribed therapy, both of which exacerbate the treatment gap [22].

## Addressing the treatment gap

Epilepsy is a major global issue but important advances can be made at a relatively low cost. One cost-analysis estimated that treating 50% of PWE worldwide would reduce the current global disability burden of epilepsy (measured in DALYs) by 13% to 40% and at a cost of only 0.20-1.33 international dollars per person per year [25]. It was suggested that phenobarbital and phenytoin were the most cost effective, costing between 4.4 and 18.3 times less than carbamazepine or sodium valproate [25]. Other studies have reported similar findings [13].

Improving the epilepsy treatment gap in RPC will likely require not only improved access to AEDs, medical facilities but also the education of all stakeholders to combat the obstructive effect of stigma. One example of what relatively modest but potentially effective measures can be undertaken are the recent proposal of a new Korean-language term for epilepsy, changing it from “mad sickness” to one that directly translates to “cerebroelectric disorder” [23]. One longitudinal study in Zimbabwe found that a 1-day training workshop for primary health care personnel led to a 74% increase in the number of people treated for epilepsy [26]. Other studies have also shown promising results for AED treatment programmes [27, 28]. That said, not all education programmes are equally effective. Two different

cohort studies have reported that simply giving information pamphlets to patients has little effect on AED adherence [26, 29]. In addition to general strategies aimed at reducing the treatment gap, targeted programmes are also possible, addressing specific risk factors in RPC. A study in Honduras showed a significant decrease in the prevalence of epilepsy due to neurocysticercosis, reported in some RPCs to be responsible for up to 36% of all epilepsy cases [30, 31], from 37% (33/90) to 14% (5/36) at the end of an eight year public health campaign [32].

“Out of the Shadows” is a global campaign and joint initiative of the ILAE, IBE and WHO, whose goal is to increase awareness and understanding and reduce the stigma associated with epilepsy as well as to help regional authorities identify and address the needs of PWE in RPCs [33]. Acknowledging that different settings will have specific needs, a useful model for epilepsy care has been described, one that incorporates stakeholders at the community and primary care level but provides for specialized care when necessary, promoting the efficient use of available resources and infrastructure as well as the importance of education of not only patients but health care providers and the wider community [34]. It is initiatives such as these that seek to implicate and educate local stakeholders as well as provide the necessary medical resources and infrastructure that likely stand the greatest chance of improving the care of PWE in RPCs.

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