


CRITICAL REVIEW

Epilepsy in Morocco: Realities, pitfalls and prospects

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Abstract

The World Health Organization (WHO) estimates that about 50 million people of all ages have epilepsy and nearly 85% of whom live in low- and middle-income (LMICs) countries. In Morocco, epilepsy is one of the major neurological health conditions, with an estimated prevalence of 1.1%. The management of patients is difficult due to multiple factors. The lack of neurologists whose number is currently 180, the uneven distribution of neurologists who are concentrated in large cities, 43% of whom are in Rabat and Casablanca alone; the low involvement of general practitioners in the management of epilepsy; the frequent consultation of traditional healers; and the low coverage of social security all contribute to the treatment gap. The management of epilepsy has advanced considerably since the early nineties. Several factors contributed to this progress: the increasing number of neurologists compared to previous years, the creation of well-equipped new academic centers, and small units of general neurology, in addition to the disuse of several antiepileptic drugs. However, much work remains to be done against the use of many forms of traditional practices and the low involvement of general practitioners in the management of epilepsy. This is the first study on epilepsy conducted in Morocco.

KEYWORDS

antiepileptic drugs, community, geographical distribution, neurosurgery, traditional practices

1 | INTRODUCTION

Epilepsy is a common disabling neurological disease.¹ The World Health Organization (WHO) estimates that there are 50 million people with epilepsy (PWE) worldwide, of which 40 million have no access to suitable health care.^{2,3}

According to the WHO, the numbers of patients with epilepsy (PWE) in Africa exceeds ten million.⁴ Three quarters of these have no access to care, because of ignorance, poverty, difficult terrain, sociocultural belief, and shortage of trained personnel.^{2,3} The Dakar declaration urged governments to

develop national plans to improve access to care, diagnosis, information, communication, and staff training.⁴

Epilepsy is the second most common reason for consultations in neurology after headaches. Its prevalence from a door-to-door study was estimated to be 1.1%.⁵ Based on the prevalence, it is projected that there are about 370 000 PWE in Morocco,³ and a reported death rate of 0.2%.⁶

Several factors influence the poorer management of PWE in rural areas. These include the lack of neurologists, and their disproportionate distribution, the low involvement of general practitioners, and false beliefs. Furthermore, the high

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cost of antiepileptic drugs and the psychosocial impact of the disease also contribute. In Morocco, as in most African countries, epilepsy is not included in the primary healthcare priority list.

Despite these difficulties, the management of epilepsy in Morocco has made great progress over the last three decades. Since independence the number of neurologists has been multiplied by 15. The number of neurologists is still insufficient to meet the WHO recommendation of one neurologist for every 50 000 people.²

2 | REALITIES OF EPILEPSY IN MOROCCO

2.1 | Health and epilepsy in morocco in figures

Since independence in 1956, Morocco has made consistent efforts to strengthen the health infrastructure. Currently, there are over 1980 basic care facilities from the 394 units in 1960. Despite these efforts, about 31% of the populations still live more than 10 km from a health facility.²

The practice of neurology started in the seventies with only one department in Rabat. This center served as a cradle for most of the subsequent neurology departments in Morocco. The second department was established in Casablanca more than 10 years after. This was followed a few years later with the establishment of another neurology department in the Military Hospital in Rabat.

In the year 2000, the only department in the Southern half of Morocco was established in Marrakech. This center had the task of managing a large number of people from various neighboring cities. Finally, in 2002 the Neurology Department of Fez was established. Besides these four main neurology departments, more regional neurological departments were opened in the cities of Oujda, Tangier, Tetouan, Meknes, Nador, Settat, El Jadida, and Agadir. Unfortunately, many cities, especially in the south, still lack neurologists (Taroudant, Tan Tan, Bengrir, Errachidia, etc) as shown on the map (Figure 1).⁶

Among these centers, those specializing in epilepsy, remain the two centers of Rabat (military and civilian) and that of Marrakech, Casablanca, and Fez. But in the past 2 years, video-EEG units have sprouted even in the private sector.

2.2 | Epilepsy and lack of healthcare infrastructure

Despite the magnitude of the problem and the lack of availability of effective therapies, epilepsy has not been considered

Key Points

- The care of patients in Morocco faces multiple difficulties to know the lack of neurologists.
- The use of traditional practices is still popular in the field of epilepsy in Morocco, especially in rural areas.
- Lesional epilepsy surgeries have become common practice in regional centers over the last 20 years. Temporal lobe resection and other specialized techniques are now performed in four university centers.

a public health priority.^{1,7} The healthcare budget is meager, and resources channeled are skewed toward other diseases such as diabetes, hypertension, and depression.

However, epileptology in Morocco has benefited from the creation of new academic centers properly furnished with modern equipment such as video-EEG and MRI.

2.3 | Epilepsy in the Moroccan community

Illiteracy and ignorance remain widespread in Morocco, particularly in rural areas. The lack of education and erroneous beliefs encourage PWE to seek mystical and religious help. This negatively influences the society's impression on the sufferer and serves as a barrier to seeking medical care.

2.4 | Terminology of Epilepsy

In Morocco, there are about 14 terms, which designate epileptic disease. They are all pejorative; for example, “MSETTI” (crazy), and “MASKOUNE” (possessed by an evil spirit). Using current terminology, patients with epilepsy and their families often think they should seek traditional healers.

In a recent work published by our team, the authors suggest many names like “falling disease,” “behavioral arrest.”⁸ A suggestion proposed in The IX LACE (Latin American Congress of Epilepsy) in Cancun, Mexico, on August 2016, “cerebral electric shock,” is the most appropriate. In our context, we started to explain these changes of terms to our patients, which seem to be more acceptable and less suggestive of mystic causes and religious interpretations.

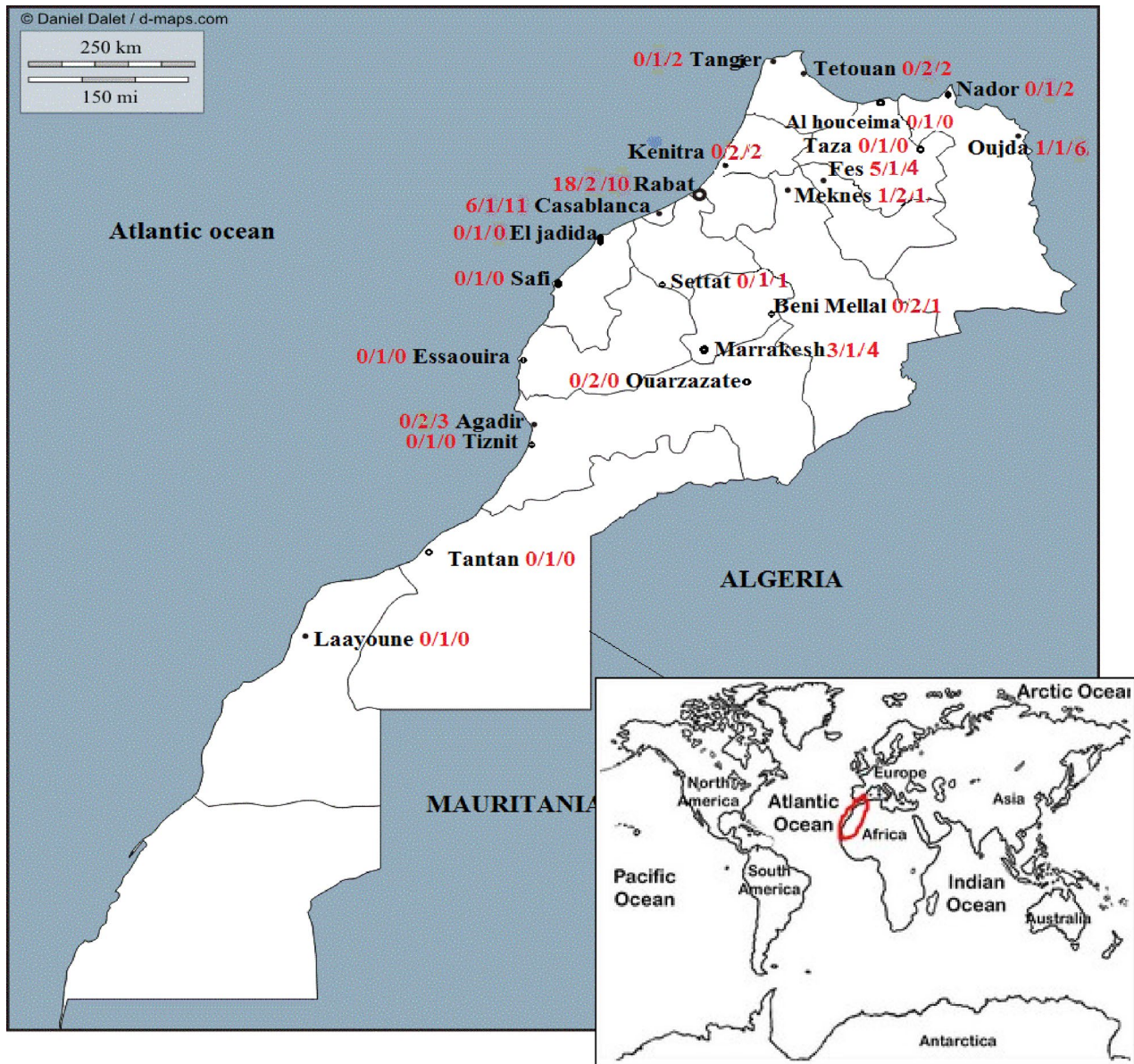


FIGURE 1 Map of the geographical distribution of neurologists in Morocco: a/b/c. a: Teaching university hospitals, b: public sector, c: private sector

2.5 | Stigma and epilepsy

A study reported that 50% of persons see epilepsy as a possession by evil forces, while 37% consider it a very serious health condition.⁹ Reactions toward patients with epilepsy could manifest in the form of hyperprotective behaviors, the imposition of prohibitions by their caregivers, intended to protect the patients from triggers and aggravating factors. This could lead to a limitation of patients' freedom. Other attitudes toward patients with epilepsy could lead to marginalization and social stigma, ultimately creating obstacles to education, work, and marriage.

2.6 | Lack of neurologists and their unequal distribution

Considerable progress has been made in medical training in Morocco. The current number of neurologists in Morocco is 180; however, most of them remain at Casablanca and Rabat and other major urban centers. The authorities have shown a keen interest in community-based medicine, yet this seems inadequate to reach a population dispersed over vast territories (Figure 1).

In April 2006, the Neurology Department of Marrakech and the Moroccan Association Against Epilepsy (MAAE) initiated a program of itinerant clinics to fill the gap in



FIGURE 2 A member of our team doing an itinerary consultation at Ouarzazate (200 km south of Marrakech)

neurology consultations in South Morocco (Figure 2). The program started at the town of Ouarzazate and its environs (Figure 3). This important region had remained without neurologists until 2010. The program has helped with the management of PWE, train general practitioners in the region to treat epilepsy, and to start an electroencephalography unit.^{2,5}

2.7 | Insufficient social security coverage

Less than 30% of Moroccan citizens had social security coverage before 2005. With the beginning of the OMA (obligatory medical assistance) in 2005 and the introduction of the medical assistance program (Medical Assistance Regime, RAMED) in 2011, the economically disadvantaged benefit from basic medical coverage and services available in the public hospitals. The program was preceded by a pilot project started in 2008 in Tadla Azilal region. RAMED has a potential for 60% of Moroccans to have social security coverage in the next few years.

2.8 | Lack of prevention of causes of epilepsy

There are a number of preventable causes of epilepsy, which include perinatal anoxic-ischemic injuries (About 8%),^{10,11} brain infections, and head injury from car accidents.¹² Road traffic accidents (RTA) are a scourge in the city of Marrakech. In 2016, there were about 4972 recorded RTAs. Motorcycle accidents were the most frequently reported.¹³ The epilepsy association has recommended preventive measures, but larger action needs to be taken by the government.

These elements of prevention can be summarized as follows:

- Promote improved maternal and neonatal health.
- Control central nervous system infections and infestations.
- Prevent head injuries from RTAs and domestic violence.
- Prevent cardiovascular risk factors.

2.9 | The problem of treatment gap

A large proportion of PWE do not receive AEDs. The obstacles are not limited to one particular sector, as ignorance, poverty, and under medicalization are the main causes. Another possible reason is the ignorance of the causes and treatment options of epilepsy, as a result of lack of education, misinformation and lack of awareness. This treatment gap exceeds 70% according to estimates during a local medical outing in rural areas and among itinerary consultations in southern Morocco.

The Bouya Omar Mausoleum, where a 16th-century faith healer claimed to have supernatural powers, is located 50 km from Marrakech. This center hosts hundreds of people suffering from psychiatric and neurological pathology including PWE. These patients are locked up improperly and sometimes isolated in individual rooms for long periods. The Health Ministry closed the shrine in 2013, but there are still other similar structures.

2.10 | Traditional practices of epilepsy in Morocco

Illiteracy, ignorance, and traditional practices can lead to poor social integration, difficulty getting married, finding and keeping a job, and a stable education (Figure 4).

The use of traditional healers is still popular in the field of epilepsy in Morocco, especially in rural areas. This fuels false beliefs. A 1999 study reported that 60% of patients said they used the traditional practices prior to being followed up in hospital. A study conducted in 2003 reported a figure of 74% in Marrakech. These practices varied, as shown in Table 1.^{14,15}

While some traditional practices like scarification and sacrifices are rejected because they are harmful to the patient, others like phytotherapy require, in our opinion, special attention because it can be a low-cost alternative.

2.11 | Ramadan and epilepsy

During Ramadan, adults abstain from eating between dawn and sunset. The hours of fasting may change from 11 to

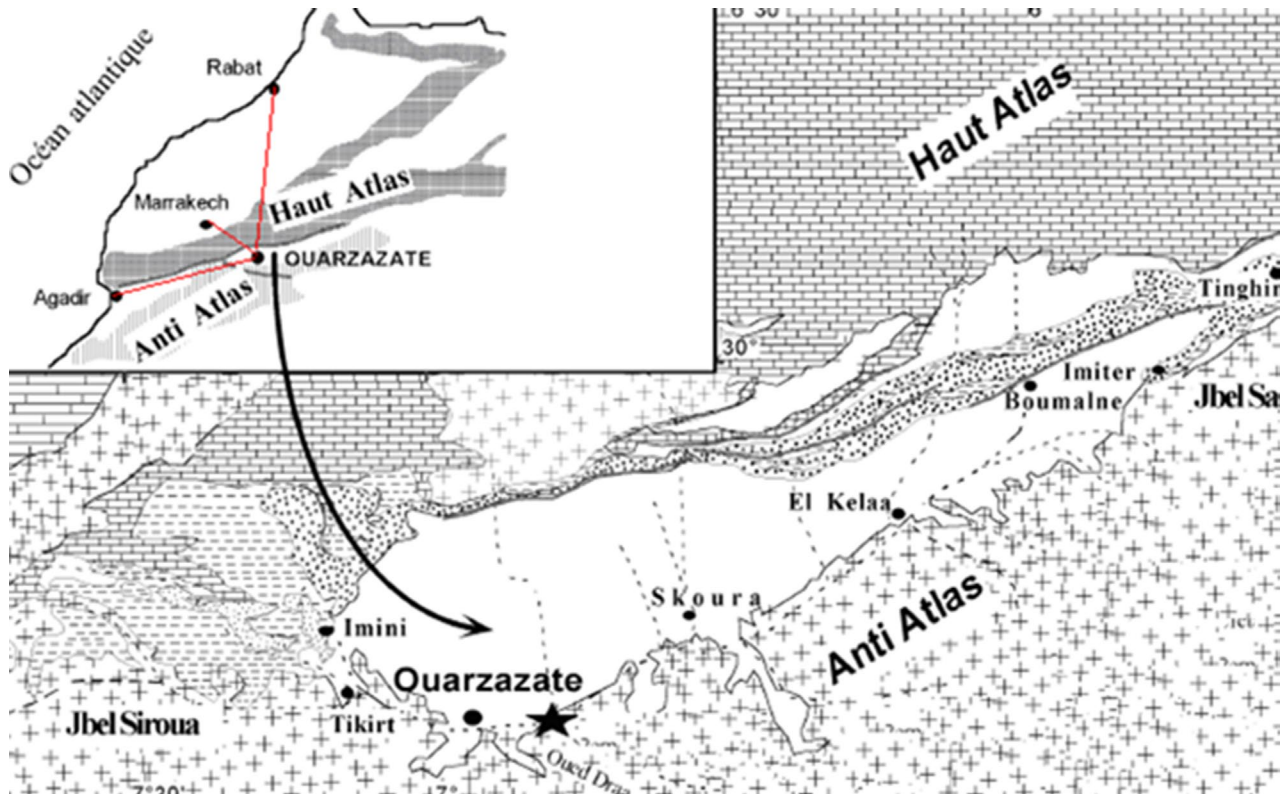


FIGURE 3 Location of the region of Ouarzazate, place of visiting clinics

18 hours accordingly to seasons. The circadian rhythm is altered, the total sleep time decreased, and sleep latency increased at the end of Ramadan.^{16,17}

A study confirmed that the seizure frequency of epilepsy patients increased during Ramadan. This increase was probably due to changes in drug intake patterns, decrease in sleep duration and/or its fragmentation, long-term fasting, emotional stress, and tiredness.¹⁸ Indeed, a worsening of epilepsies is observed in the different consultations and can be explained by these factors.

Physicians should plan consultations before Ramadan and increase follow-up during the fasting period. It is important to explain to patients the effect of fasting on their seizures and possibly switch treatment to prolonged-release forms. Fasting could be stopped if seizures are difficult to control.

2.12 | The treatment of epilepsy in morocco

2.12.1 | Medical treatment

Management of epilepsy ranges from optimal to poor, very appropriate one in the epilepsy clinics in Marrakech, Rabat, and Fez university hospitals. In the other 4 university hospitals, the management is optimal, as in many public hospitals

and private clinics. Otherwise, the management is poorer, mainly in the private sector where no neurologists are dealing with PWE, and some strange attitudes are in use, and some psychiatrists and neurosurgeons are practicing EEG, causing a lot of misdiagnosis and taking some attitudes harming PWE.

Most patients consulted a traditional practitioner for the first time, or consulted several general practitioners before consulting neurologists, hence, the delay in diagnosis and treatment. This aspect underlined the importance to develop teams and centers specialized in this area.

Treatment is initiated when the diagnosis of epilepsy is clear, based on clinical and EEG data with a better identification of electroclinical syndrome, while explaining to the patient and his family treatment principles: the regularity of drug intake, the duration of treatment, and the need for regular medical supervision. The choice of drug is based on the type of epilepsy, underlying conditions, side effects, and especially socioeconomic conditions in our context^{2,7} (Table 2).

The drugs commonly used at present are sodium valproate and carbamazepine and Phenobarbital. In a comparative study done in neurology at the University Hospital of Rabat, it was shown that phenobarbital was the most prescribed drug in Morocco in 1987 (57.1%), against 49.4% in 1994, followed by sodium valproate (28% in 1987 and

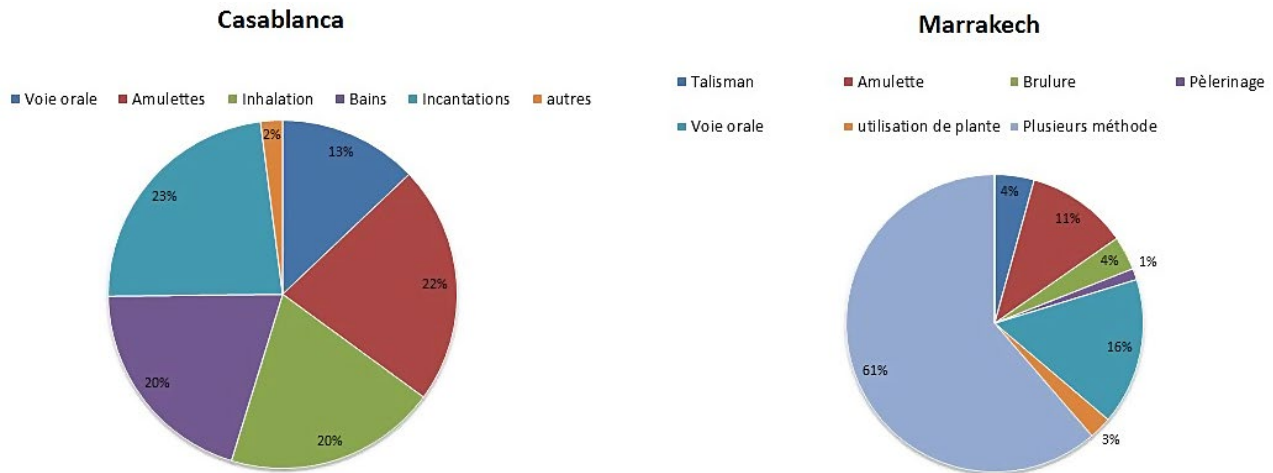


FIGURE 4 Pie chart showing traditional practices of epilepsy in Casablanca and Marrakech

1994), then the carbamazepine (8% in 1987% vs 19.3% in 1994).¹⁹

A recent published work done at Marrakech in 2019 found that carbamazepine is the most prescribed drug (43.46%), followed by sodium valproate (31.76%), and phenobarbital is the least prescribed (5.70%). The new drugs have been increasingly used over the last 6 years.²⁰

The price of AEDs varies 13dh (1.48 USD) for phenobarbital to 666dh (69.20 USD) for gabapentin.

2.12.2 | Surgical treatment

Lesional epilepsy surgery has been a common practice in Morocco since the seventies. Epilepsy surgery was initiated in 2005 at the University Hospital of Rabat in collaboration with the Neurosurgery Department of Saint-Anne Hospital in Paris. This team started by exclusively recruiting drug-resistant temporal epilepsy patients.²¹ The initial results were encouraging, which allowed for inclusion of extratemporal epilepsies. Seven years later, departments of neurology and neurosurgery of the University Hospital of Fez collaborated with the same team and initiated epilepsy surgery in order to address patients' demand for surgical options.^{9,10,21-24}

Video-EEG is the major tool of stage I exploration of partial drug-resistant epilepsies. This investigation requires an electroclinical recording unit and a multidisciplinary team. This explains the low number of presurgical investigative units in Morocco and the delay in evaluating candidates in our units. The neuropsychological evaluation is a critical aspect in the care of partial drug-resistant epilepsy.²⁵ In our setting, there are no qualified neuropsychologists; therefore, our patients were evaluated by neuropsychologists in Rabat, while others were examined by psychologists in training.

However, the psychiatric evaluation is not practiced by all centers despite its importance.

2.13 | Drug-resistant epilepsies

Approximately 20%-30% of epilepsies are refractory to current drug treatments.²⁶

A study on drug-resistant epileptic patients done in Hassan II University Hospital Fez included 25 cases and showed that the history of febrile seizures was found in 36% of patients, the concept of consanguinity in 28%, head trauma in 20%, and fetal distress in 16%. Complex partial seizures and secondarily generalized partial seizures were the commonest seizure type (72%), with a frequency that exceeds a seizure a week in 64% of our patients. Epilepsy was temporal in 56% of patients. Hippocampal sclerosis and sequellar epilepsy were the most common etiologies (57%). Epilepsy surgery was performed in 28% of patients with a mean waiting time of up to 15 years. The outcome of the surgery was very satisfactory in 5/7 patients.²⁷ These results were similar to other series reported in the literature.^{21,22,24}

2.14 | Epilepsy in continuing medical education of general practitioners

2.14.1 | Role of associations in the training of general practitioners

Initiated in 1997, by the Moroccan League Against Epilepsy (MAAE), the project "Epilepsia" offers training sessions for general practitioners (GPs), since they are situated on the frontlines of the health system in Morocco. The MAAE also introduced a training program focusing on better education

TABLE 1 Percentage of traditional practices prior to medical visit

Countries		Percentage of traditional practices prior to medical visit
Nigeria		47.6%
Morocco	Casablanca	66.4%
	Marrakech	60%
	Ouarzazate	63.8%

and implication of GPs, especially in the cities of the south and east of Morocco without neurologists.

2.14.2 | Epilepsy specialist training in neurology

Epilepsy occupies an important place in the training of specialists in neurology in Morocco, although they do not have access to modern investigations and new antiepileptic drugs (Table 2).

In the curriculum for training neurologists in Morocco, epilepsy has an average place, the number of teaching hours in the medical school is 6 hours (2 for semiology, 2 for pathology, and 2 for therapeutics); there are other limitations for a good practice and management of epilepsy, as lack for specialized explorations outside of the university hospitals and also ruptures of some classical and new antiepileptic drugs.

2.14.3 | Prospects

Decision-makers and health officials must take actions to bring PWE out of the dark, improve their care, and reduce the morbidity of this disease which is currently a real public health problem in Morocco. Authorities can take measures such as:

- Recognition of epilepsy as an organic disease and not part of “mental” illness, as is the case currently at the Department of Public Health.
- Strengthening the training of medical and paramedical staff.
- Create and develop centers for epileptology, as epilepsy is also managed by specialists other than neurologists, such as psychiatrists and neurosurgeons.
- Improve preventive strategies on diseases that cause epilepsy. Perinatal events and febrile convulsions.
- Facilitate access to antiepileptic drugs including generics.
- Public awareness and education of PWE, their families, and the society.

TABLE 2 Antiepileptic drugs available in Morocco

The classic antiepileptic drugs	
Carbamazepine	Tegretol®, Crizepine®, Zeptol®, Alepsia®, Carbamazepine Normon®.
Phenobarbital	Gardenal®
Sodium valproate	Depakine®, Micropakine®, Encorate®
New antiepileptic drugs	
Gabapentin	Neurontin®, Gabamax®, Nupentin®.
Lamotrigine	Lamotrigine®, Synmax®.
Oxcarbazepine	Trileptal®
Levetiracetam	Keppra®
Topiramate	Topiramate GT®

3 | COMPARISON WITH OTHER RESOURCE-POOR COUNTRIES

The situation of epilepsy in developing countries, in particular, African countries, does not differ from that in Morocco. The prevalence of epilepsy is very high, and studies in Africa show that this prevalence ranges from 1.06% to 4.90%,²⁸⁻³¹ and as high as 6% in the Mbam valley in Cameroon.³² Parasitic infections, particularly neurocysticercosis, are important etiological factors for epilepsy in many of these countries.³³ In contrast to the industrialized countries, focal convulsions seem to be more frequent in developing countries.³³ The treatment of epilepsy as in Morocco encounters various obstacles, such as the cultural perception of the disease, the low priority accorded to it by the health authorities, the lack of infrastructure and neurologists, and the irregular supply of medicines.¹⁴

4 | CONCLUSION

Epilepsy is one of the most common neurological disorders. It is a disease poorly budgeted for and inadequately treated in Morocco. Epidemiological studies of prevalence are essential to focus on the magnitude of the problem and make epilepsy a health priority in Morocco. Many PWE are poorly or not managed at all, because of the lack of neurologists and their uneven distribution, the low involvement of general practitioners, and the lack of medicines. Illiteracy and ignorance add a social and economic burden. It seems necessary to adopt a global approach to sensitize policymakers, patients, and the entire community.

The general practitioners should also be trained and motivated for the treatment of epilepsy. Local communities must be involved in planning and implementing interventions to

promote the inclusion of epilepsy as a socioprofessional environment. In addition, there should be at the highest level of engagement and support of political authorities to ensure that epilepsy is figured among the national health priorities and that the supply of new drugs can be ensured. There should also be the willingness to address many preventable causes of epilepsy in Morocco such as neonatal distress, neuromeningeal infections, and head injuries.

The treatment gap can be bridged only really if we attack the problem of poverty and inequality of income and opportunities at regional and national levels. The level and relevance of knowledge of the population's perception of the disease, its expectations, its ability to change, extra dimensions are not medical neglect.

A comprehensive care integrated into a framework defined by economic status and socio-medico-country health is essential for proper management of epilepsy in Morocco.

At this point, it seems extremely useful to conduct studies to obtain data on the cost-effectiveness of treatment of epilepsy compared to other health problems, in order to convince health policymakers that the need for the treatment of epilepsy is a national priority in Morocco.

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None of the authors has any conflict of interest to disclose. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

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REFERENCES

- Hajjioui A, Fourtassi M. Epilepsy and disability. *North Afr Middle East Epilepsy J.* 2014;3(5):17–9.
- Global campaign against epilepsy out of the shadows. 2005. [cited 2019 Feb 10]. Available from https://www.who.int/mental_health/management/en/GcaeBroEn.pdf?ua=1
- Kissani N. Situation of epilepsy in North Africa and Middle East region and Arab Spring. *North Afr Middle East Epilepsy J.* 2012;1(1):5–9.
- Epilepsy in the WHO African region. 2004. [cited 2019 Sep 3]. Available from www.who.int/mental_health/management/epilepsy_in_African-region.pdf
- Itri M, Hadj KH. Enquête épidémiologique sur les épilepsies de l'enfant. *Les Cahiers du médecin.* 1998;1(9):36–8.
- Santé en chiffre 2015 Edition 2016, Moroccan Ministry of Health. [cited 2019 Sep 3]. Available from http://www.sante.gov.ma/Publications/Etudes_enquete/Documents/04-2016/SANTE%20EN%20CHIFFRES%202015%20Edition%202016.pdf
- Ngugi AK, Kariuki SM, Bottomley C, Kleinschmidt I, Sander JW, Newton CR. Incidence of epilepsy: a systematic review and meta-analysis. *Neurology.* 2011;77(10):1005–12.
- Kissani N, Naji Y. The terminology of epilepsy in Arabic and its consequences in Morocco. *Epilepsy Behav.* 2020;103(Pt A):106461.
- Cherian PJ, Radhakrishnan K. Selection of ideal candidates for epilepsy surgery in developing countries. *Neurol India.* 2002;50(1):11–6.
- Belfkih R, Souirti Z, Belahsen F, Messouak O. L'épilepsie dans la région de Fès-Boulemane: suivi prospectif d'une cohorte de 60 patients. *North Afr Middle East Epilepsy J.* 2012;1(2):20–3.
- Fakhir B, Aboufalah A, Asmouki H, Soummami A. Epilepsy and pregnancy: Obstetrician view of point. *North Afr Middle East Epilepsy J.* 2014;3(5):8–11.
- Essanhaji A, Kissani N, Kadiri B. Post traumatic epilepsy secondary to severe head injury, a retrospective analysis of 40 cases in Marrakech Morocco. *North Afr Middle East Epilepsy J.* 2015;4(1):12–5.
- Recueil des statistiques des accidents corporels de la circulation routière 2016 Ministère de l'Équipement et du Transport. [cited 2019 Sep 3]. Available from <http://www.equipement.gov.ma/AR/Infrastructures-routieres/Reseau-Routier-du-Maroc/Documents/Recueil%20des%20accidents%20de%202016%20VF.pdf>
- Danesi MA, Adetunji JB. Use of alternative medicine by patients with epilepsy: a survey of 265 epileptic patients in a developing country. *Epilepsia.* 1994;35(2):344–51.
- Louhab N, Jafoui M, Stoti N, Kissani N. Prospective evaluation of traditional practices for epileptic patients of Marrakech. *Epilepsia.* 2005;46(6):356.
- Roky R, Chapotot F, Hakkou F, Benchekroun MT, Buguet A. Sleep during Ramadan intermittent fasting. *J Sleep Res.* 2001;10(4):319–27.
- Bahammam A. Does Ramadan fasting affect sleep? *Int J Clin Pract.* 2007;60:1631–7.
- Gomceli YB, Kutlu G, Cavdar L, Inan LE. Does the seizure frequency increase in Ramadan? *Seizure.* 2008;17(8):671–6.
- Kissani N, Belaidi H, Othmani MB, Tahiri SM, Ouazzani R, Chkili T. Comparaison du profil des patients épileptiques au Maroc à plusieurs années d'intervalle. *Epilepsies.* 2001;13(4):251–8.
- Cherkaoui Rhazouani O, Kissani N. Therapeutic profile of epilepsies at the University Hospital of Marrakech (Cohort of 1017 cases of active epilepsy). *North Afr Middle East Epilepsy J.* 2016;5(4):9–13.
- El Khamlichi A, Melhaoui A, Bouchaouch A, El Hajjouji F, El Ouazzani R. Chirurgie de l'épilepsie: expérience préliminaire du Maroc. *Neurochirurgie.* 2011;57(4–6):274–5.
- McIntosh AM, Wilson SJ, Berkovic SF. Seizure outcome after temporal lobectomy: current research practice and findings. *Epilepsia.* 2001;42(10):1288–307.
- Eliashiv SD, Dewar S, Wainwright I, Engel J, Fried I. Long-term follow-up after temporal lobe resection for lesions associated with chronic seizures. *Neurology.* 1997;48(5):1383–8.
- Devaux B, Chassoux F, Guenot M, Haegelen C, Bartolomei F, Rougier A, et al. La chirurgie de l'épilepsie en France: Évaluation de l'activité. *Neurochirurgie.* 2008;54(3):453–65.
- Smith ML. Presurgical neuropsychological assessment. In: Jambaqué I, Lassonde M, Dulac O, editors. *Neuropsychology of Childhood Epilepsy* [Internet]. Boston, MA: Springer, US; 2001: 207–14. [cited 2020 Apr 9] (*Advances in Behavioral Biology*). https://doi.org/10.1007/0-306-47612-6_23

26. Berg AT, Langfitt J, Shinnar S, Vickrey BG, Sperling MR, Walczak T, et al. How long does it take for partial epilepsy to become intractable? *Neurology*. 2003;60(2):186–90.
27. Thesis: Ben Sghaier Ahmed. Drug-resistant epilepsies. Faculty of Medicine and Pharmacy of Fez. 2014. N: 076/14.
28. Gelfand M. Epilepsy in the African. *Cent Afr J Med*. 1957;3:11–2.
29. Dongmo L, Mbonda E, Motso O, Mbede J. Épilepsie infantile à Yaoundé : analyse de 174 cas. *Med Afr Noire*. 1992;32:124–5.
30. Kamgno J, Sebastien DS, Michel B. Demographic impact of epilepsy in Africa: results of a 10 year Cohort study in a rural area of Cameroon. *Epilepsia*. 2000;44:432–9.
31. Boussinesq M, Pion SD, Demanga-Ngangue KJ. Relationship between onchocerciasis and epilepsy: a matched case-control study in the Mbam Valley, Republic of Cameroon. *Trans R Soc Trop Med Hyg*. 2002;96:537–41.
32. Dongmo L, Druet-Cabanac M, Moyou SR, Zebaze DRM, Njamnshi AK, Sini V, et al. Cysticercose et épilepsie : étude cas-témoins dans la vallée du Mbam, Cameroun. *Bull Soc Pathol Exot*. 2004;97:105–8.
33. Senanayake N, Roman GC. Epidemiology of epilepsy in developing countries. *Bull. World Health Organ*. 1993;71(2):247–58.

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