

◆ Definitions

- ◆ **Paediatric neurology services** include any hospital, clinic or centre that deals with neurological diseases in children.
- ◆ **Neurological rehabilitation services** are team based comprehensive multidisciplinary programmes designed to improve function, reduce symptoms and improve the well-being of patients with neurological problems and their families in their social milieu. These services can be organized as inpatient, outpatient or day-care services.
- ◆ **Neuroradiology services** are concerned with the diagnostic radiology of diseases of the nervous system through the use of X-ray, CT scan, magnetic resonance imaging, and angiography and other diagnostic facilities.
- ◆ **Stroke units** provide organized care to stroke patients by multidisciplinary teams. They are characterized by coordinated multidisciplinary rehabilitation, staff with a special interest in stroke or rehabilitation, routine involvement of carers in the rehabilitation process, and regular programmes of education and training.

◆ Salient Findings

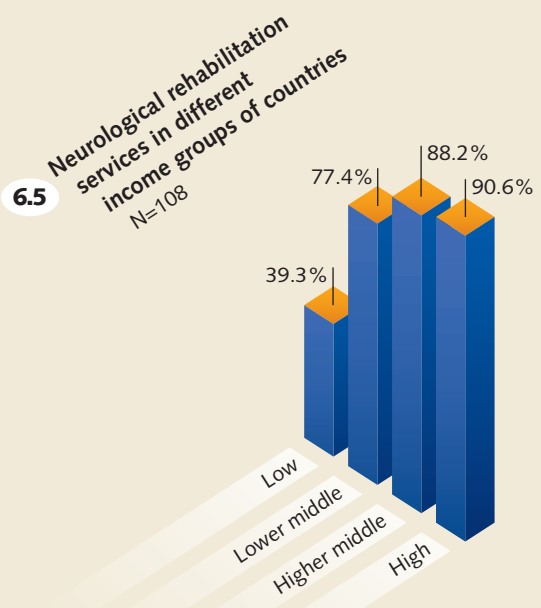
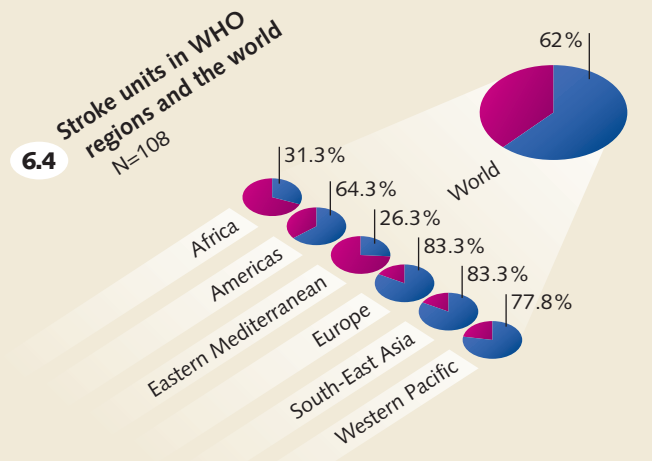
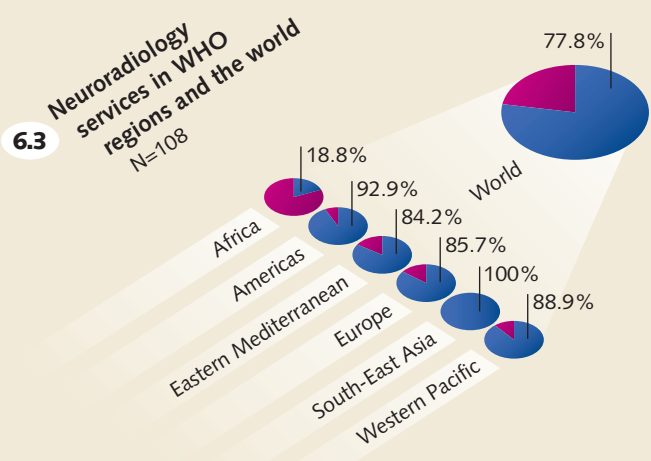
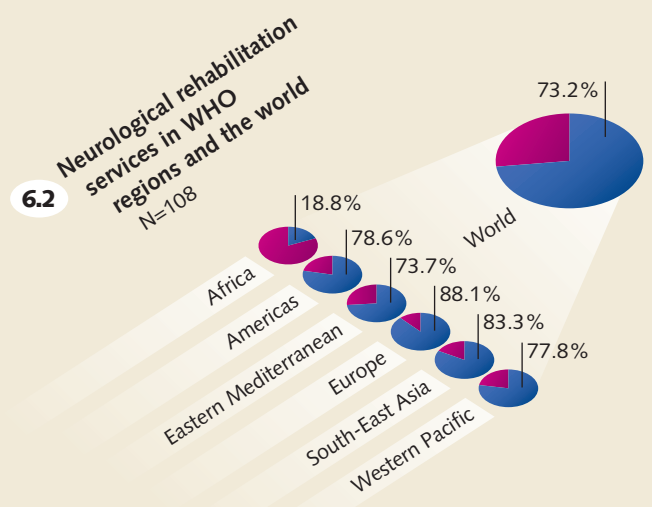
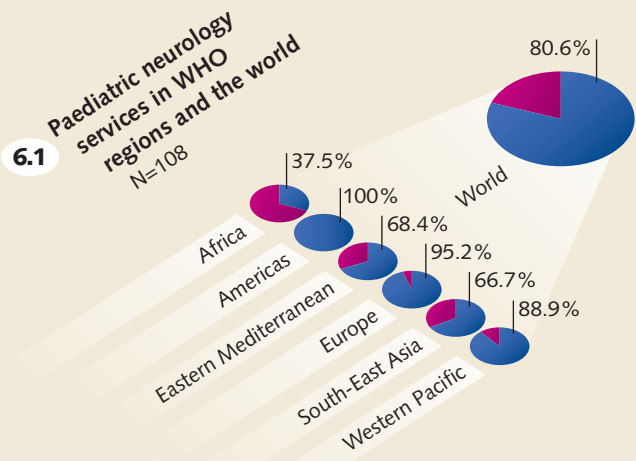
- ◆ Some paediatric neurology service is present in 80.6% of countries that responded. No paediatric neurology services are available in 50% of low-income countries. No paediatric neurology services are available in 62.5% of countries in Africa, 33.3% in South-East Asia, and 31.6% in the Eastern Mediterranean.
- ◆ Some neurological rehabilitation service is present in 73.2% of responding countries. In 60.7% of low-income countries, no neurological rehabilitation service is available. No neurological rehabilitation service is present in 81.2% of countries in Africa.
- ◆ Some neuroradiology service is present in 77.8% of countries that responded. No neuroradiology services are available in 57.1% of low-income countries. In 81.2% of countries in Africa, no neuroradiology services are present.
- ◆ Some kind of stroke unit is present in 62% of responding countries. In 57.1% of low-income countries, stroke units are not available and they are also absent in 25% of high-income countries.
- ◆ In 73.7% of countries in the Eastern Mediterranean and in 68.7% of countries in Africa, no stroke units are present and they are also absent in 35.7% of countries in the Americas, 16.7% in Europe, 16.7% in South-East Asia, and 22.2% in the Western Pacific.

◆ Limitations

- ◆ Respondents may have replied positively to the question of availability of subspecialized neurological services in the country even if only a very limited number of such facilities are available in a few large cities, as no information was obtained on the type, quality and estimated numbers of such facilities.
- ◆ Some respondents may have responded in the affirmative even if the subspecialized services are a part of the general services, e.g. neuroradiology as a part of the general radiological facilities.

◆ Implications

- ◆ Subspecialized neurological services are important because many neurological disorders require highly specialized skills for appropriate diagnosis and management. They also provide the basis for carrying out research and training for various neurological disorders.
- ◆ The profile of neurological disorders is different in children compared with the general adult population. Special services are, therefore, needed for them as a group.
- ◆ A neurological component should be an important part of rehabilitation training of community health workers, because community-based, family-centred and culturally responsive care is the best model to help people with neurological disabilities achieve the highest possible level of function and independence.
- ◆ For correct diagnosis and subsequent management of neurological disorders, neuroradiology services are essential. For example, in the case of head trauma, neuroradiology can help to delineate the extent of brain injury or presence of haematoma requiring urgent surgical intervention.
- ◆ Substantial evidence shows that organized inpatient care in a stroke unit decreases mortality and residual disability, increases the number of independent survivors and reduces institutionalization, without increasing the cost of care. As these units can be established within the existing medical facilities with minor reorganization of services and training of existing staff without major extra cost to the health-care system, an effort in this direction is required.



Present
Absent

◆ Definitions

- ◆ In this context, a **neurologist** is a medical graduate who has successfully completed at least two years of postgrad-

uate training in neurology from a recognized teaching institution.

◆ Salient Findings

- ◆ In total, 85 318 neurologists are reported to be available in 106 countries. The median number of neurologists in the responding countries is 0.91 per 100 000 population (interquartile range 0.18–4.48).
- ◆ The median number of neurologists per 100 000 population also varies widely across regions: 0.03 in Africa, 0.07 in South-East Asia, 0.32 in the Eastern Mediterranean, 0.77 in the Western Pacific, 0.89 in the Americas, and 4.84 in Europe.
- ◆ All responding countries in Africa and South-East Asia, 89% in the Eastern Mediterranean, 67% in the Western Pacific, 50% in the Americas and 7% in Europe have less than one neurologist per 100 000 population.

- ◆ In terms of the population covered, 25% have access to more than one neurologist per 100 000 population.
- ◆ The median number of neurologist per 100 000 population across different income groups of countries also varies: 0.03 for low-income countries compared with 2.96 for high-income countries. Even among high-income countries, 24% have access to less than one neurologist per 100 000 population.
- ◆ The median number of neurologists per 100 000 population is 2.30 for countries in population category I compared to 0.62 in population category IV.

◆ Limitations

- ◆ Because the sources of information in most countries were key persons working in neurology, the data pertain mainly to countries where there are neurologists or persons with an interest in neurology. It is therefore possible that the above figures might be overestimated.
- ◆ In some countries, neurological diseases such as epilepsy and dementia are also managed by psychiatrists.

The information from these countries might therefore be an underestimate.

- ◆ Information about the distribution of neurologists within countries is not available but, as reported by some respondents, the majority are likely to be concentrated in urban areas, thus leading to more inequity than is apparent from the above figures.

◆ Implications

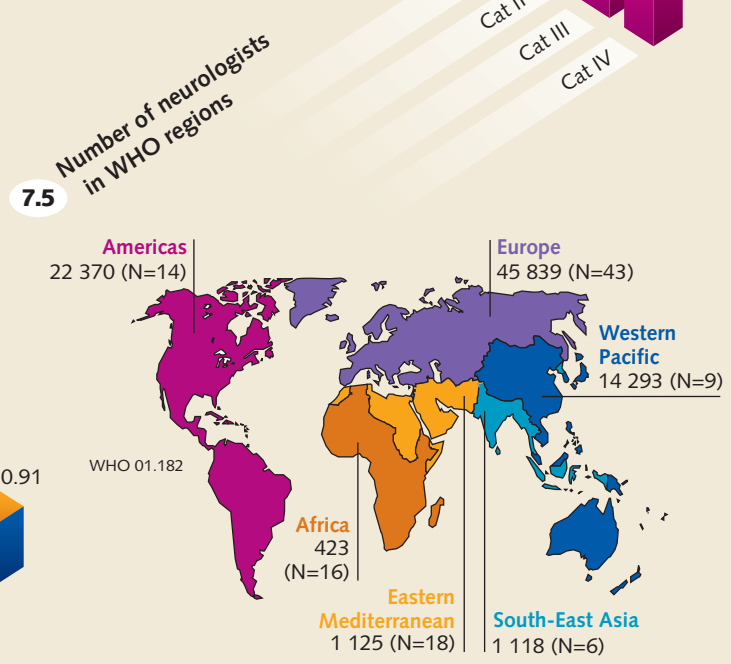
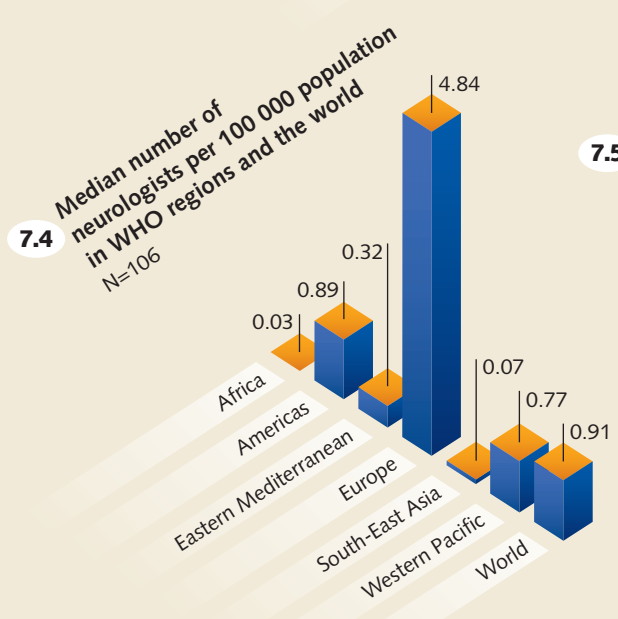
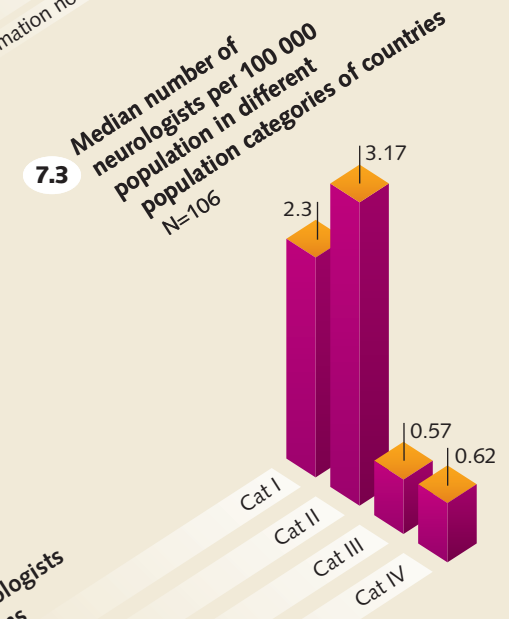
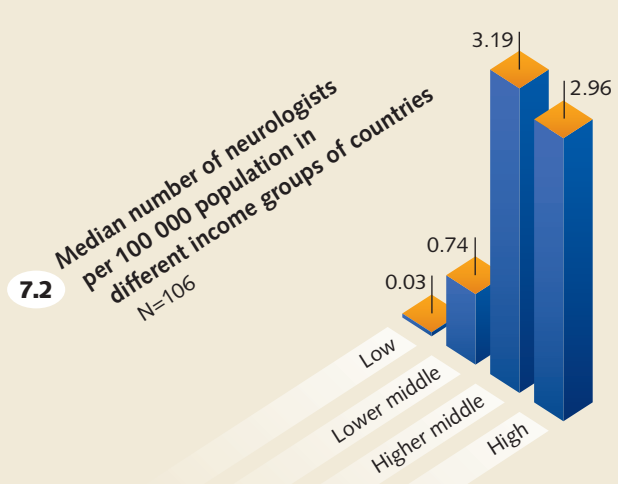
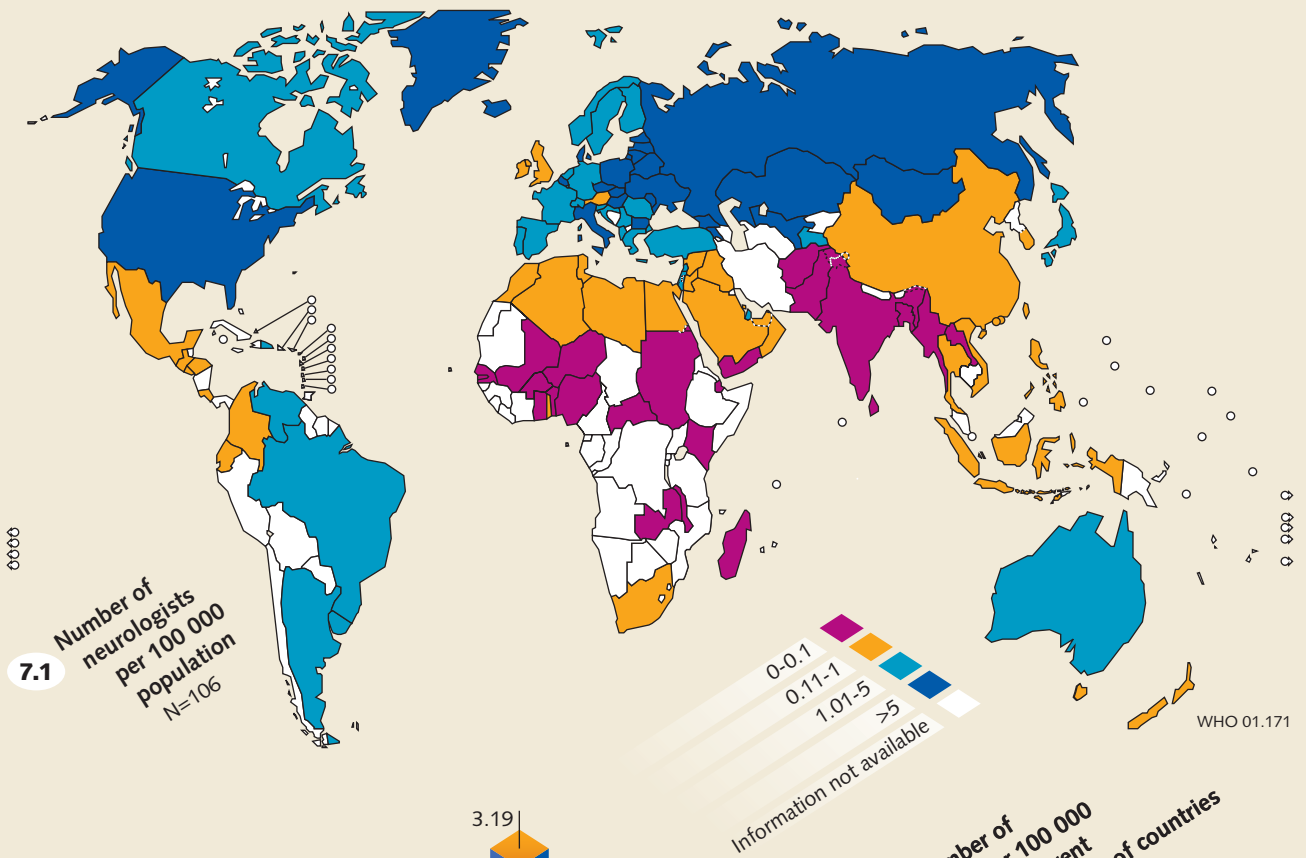
- ◆ Neurologists are essential in order to provide comprehensive neurological care. They are also important for providing training, support and supervision to nurses, other paramedical staff and primary health-care providers in neurological care.
- ◆ The inequity in the number of neurologists observed across countries in different income groups, population categories and geographical areas needs to be specifically dealt with.

- ◆ The appropriate number of neurologists in the population depends upon the structure of a country's health-care system, the way in which primary care is delivered, the role played by specialists, and the geographical distribution of the population. In high-income countries with large concentrations of urban population, the specialists primarily act as clinical caregivers; in low-income countries with large, widely distributed rural populations the most appropriate role for smaller numbers of specialists may be in training and education of primary health-care personnel, and in advising on health care planning.

Review of literature

Reports are available from 67 countries regarding the number of neurologists (32, 36, 42–49). According to the above reports, a median number of 2.5 (interquartile range 0.6–4.7) neurologists per 100 000 population are available in these countries. The figure is congruent with the Atlas data wherein median number of 2.4 (interquartile range 0.5–5.3) neurologists per 100 000 population

are present in these countries. Recommendations regarding the required number of neurologists in a country are available from countries in Europe and the Americas, varying between 1 and 5 per 100 000 population. The number of available neurologists in many of the low-income countries is very much lower than any of these recommendations.



◆ Definitions

- ◆ In this context, a **neurological nurse** is a registered nurse who graduated from a recognized nursing school and

successfully completed required additional training in neurological nursing.

◆ Salient Findings

- ◆ A total of 54 693 neurological nurses are reported to be available in 82 countries. The median number of neurological nurses in the responding countries is 0.11 per 100 000 population (interquartile range 0–1.66).
- ◆ The median number of neurological nurses per 100 000 population varies widely across regions. It is 0 in Africa, 0.005 in South-East Asia, 0.13 in the Eastern Mediterranean, 0.14 in the Americas, 0.32 in the Western Pacific, and 2.43 in Europe.
- ◆ Of the responding countries, 71% have access to less than one neurological nurse per 100 000 population; 39% have no neurological nurses. In terms of population covered, more than one neurological nurse per 100 000 population is available for 36.4% of the population.
- ◆ Regionally, all responding countries in Africa and South-East Asia, 90% in the Americas, 87.5% in the Western

Pacific, 71.4% in the Eastern Mediterranean, and 41.9% in Europe have less than one neurological nurse per 100 000 population.

- ◆ The median number of neurological nurses per 100 000 population across different income groups of countries also varies. It is 0 for low-income countries, 5.04 for higher middle-income countries, and 0.38 for high-income countries.
- ◆ Even among high-income countries, two thirds have access to less than one neurological nurse per 100 000 population.
- ◆ There are more neurologists than neurological nurses in many of the countries (the ratio of neurological nurses to neurologists is less than one in 73% of the responding countries).

◆ Limitations

- ◆ In many countries where no formal training programme exists for neurological nursing, many nurses are informally trained in aspects of neurological care. This is not reflected in the data.
- ◆ Some countries were unable to provide data regarding

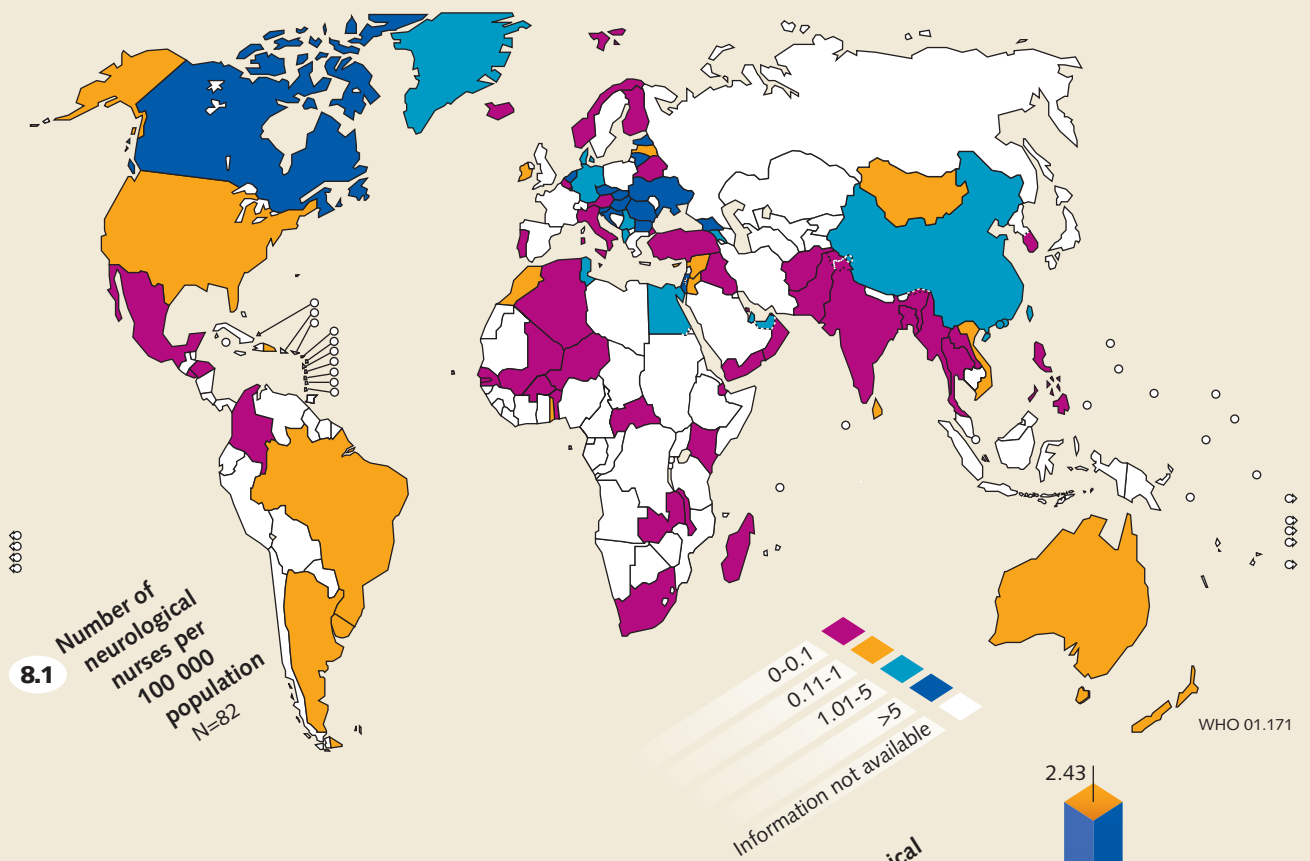
neurological nurses as they do not have a separate register for nursing subspecialties.

- ◆ Information about the distribution of neurological nurses in countries is not available, but the majority are likely to be concentrated in urban areas.

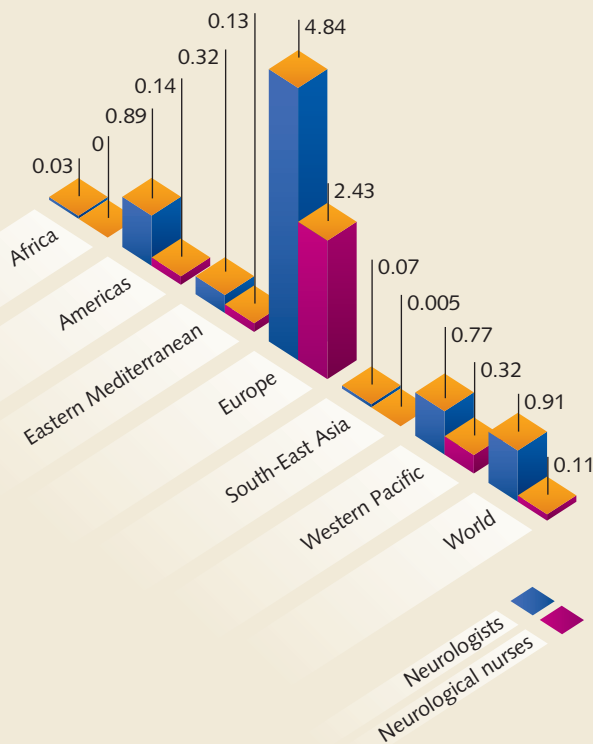
◆ Implications

- ◆ Neurological nurses are important members of the team that provides comprehensive neurological care, training and supervision.
- ◆ While training for neurologists is being pursued, specialized neurological nursing training has been neglected even in developed countries.

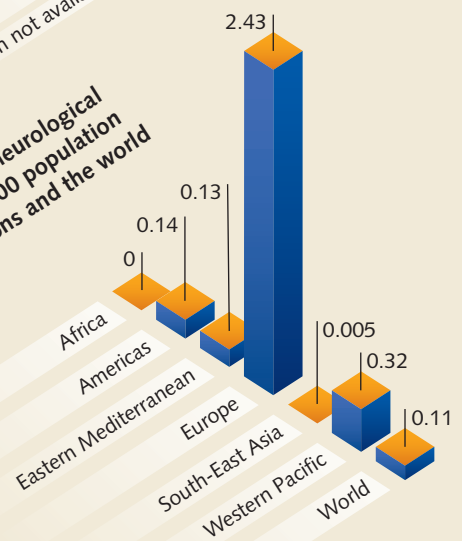
- ◆ In countries where no formal training facilities exist for neurological nursing, general nurses can be trained to provide specific neurological care.



8.3 Comparison of median number of neurologists and neurological nurses per 100 000 population in WHO regions and the world
N=82



8.2 Median number of neurological nurses per 100 000 population in WHO regions and the world
N=82



8.4 Number of neurological nurses in WHO regions

