

INTRODUCTION

Despite that headache is felt, at some time, by nearly everybody, and almost half the world's adults at any one time have recent personal experience of one or more of the three very common headache disorders (1), much is unknown about the public-health impact of these conditions. It is not known how, or how much, they affect many of the populations of the world, or how health-care and other resources are utilized to mitigate their effects.

This first global enquiry into these matters, consulting specialist and general physicians and people who have headache, is an attempt to document from country to country, region to region, the responses to a public-health priority.

HEADACHE DISORDERS

Headache is a painful feature of a number of primary headache disorders, two of which – migraine and tension-type headache – are widespread, prevalent and often life-long conditions. These, together with medication-overuse headache, are disorders of substantial public-health importance because, collectively, they are the cause of much disability in populations throughout the world.

MIGRAINE

This is a disorder that almost certainly has a genetic basis (2), but environmental factors play a significant role in how it affects those who have it. Pathophysiologically, activation of a mechanism deep in the brain causes release of pain-producing inflammatory substances around the nerves and blood vessels of the head. Why this happens periodically in migraine attacks, and what brings the process to an end in spontaneous resolution of these attacks, are uncertain.

Usually starting at puberty, migraine is recurrent – in many cases throughout life. Adults with migraine describe episodic disabling attacks in which headache and nausea are the most characteristic features; others are vomiting and/or dislike or intolerance of normal levels of light and sound. Headache is typically moderate or severe in intensity, one-sided and/or pulsating, and aggravated by routine physical activity; it lasts for hours up to 2–3 days. Attack frequency is, on average, once or twice a month but can be anywhere between once a year and once a week, often subject to lifestyle and environmental factors that suggest people with migraine react adversely to changes in routine.

TENSION-TYPE HEADACHE

The mechanism of tension-type headache is poorly understood. It has long been regarded as a headache with muscular origins, but this may not be entirely correct (3). It may be stress-related or associated with musculoskeletal problems in the neck.

Tension-type headache pursues a highly variable course, often beginning during the teenage years and reaching peak levels in the 30s. Headache is usually mild or moderate, and generalized, described as pressure or tightness, like a band around the head, sometimes spreading into or from the neck. It lacks the specific features and associated symptoms of migraine. There are distinct sub-types although, in any individual, one may give way to the other. As experienced by very large numbers of people, episodic tension-type headache occurs, like migraine, in attack-like episodes. These usually last no more than a few hours but can persist for several days. Chronic tension-type headache is less common but, occurring by definition on 15 or more days every month, and sometimes unremitting over long periods, this variant is much more disabling.

MEDICATION-OVERUSE HEADACHE

Chronic excessive use of medication to *treat* headache is the cause of this disorder (4), which also manifests as headache on 15 or more days every month. It is therefore wholly avoidable. All medications for the acute or symptomatic treatment of headache, in overuse, are associated with this problem, although the mechanism through which it develops undoubtedly varies between different drug classes. Frequency of use is important: even when the total quantities are similar, low daily doses carry greater risk than larger weekly doses.

Medication-overuse headache is oppressive, persistent and often at its worst on awakening in the morning. A typical history begins with episodic headache – migraine or tension-type headache. The condition is treated with an analgesic or other medication for each attack. Over time, headache episodes become more frequent, as does medication intake. In the end-stage, which not all patients reach, headache persists all day, fluctuating with medication use repeated every few hours. This evolution occurs over a few weeks or much, much longer. A common and probably key factor at some stage in the development of medication-overuse headache is a switch to pre-emptive use of medication, in anticipation of headache and with a wish to prevent it and its undesired consequences.

EPIDEMIOLOGY AND BURDEN

Although headache disorders are among the most common of all health disorders (5), their epidemiology is only partly documented. Population-based studies have mostly focused on migraine which, although the most frequently studied, is not the most common headache disorder. Tension-type headache is more prevalent, while the group of headaches occurring on 15 or more days every month are generally more disabling, but both of these have received less attention. Furthermore, relatively few population-based studies exist for resource-poor countries. In these countries, limited funding and often largely rural (and therefore less accessible) populations, coupled with the low profile of headache disorders compared with communicable diseases, stand in the way of systematic collection of information.

Nevertheless, despite regional variations, there can be no doubt that headache disorders are highly prevalent everywhere, affecting people of all ages, races, income levels and geographical areas. Population-based data are in the process of being gathered, filling the knowledge gaps that exist in many of the world's regions. Present knowledge informs us meanwhile that migraine affects 11 % of adults worldwide (1), with a three-times higher rate in women, which is hormonally-driven. Migraine is less common in children and in the elderly. Extrapolation from figures for migraine prevalence and attack incidence suggests that 3,000 migraine attacks occur *every day* for each million of the general population (6).

Episodic tension-type headache is the most common headache disorder, reported by over 70 % of some populations (7). Worldwide its 1-year prevalence appears to vary greatly, with an average of 42 % in adults (1), rather higher in women than in men. Chronic tension-type headache affects 1–3 % of adults (1).

In terms of prevalence, medication-overuse headache far outweighs all other secondary headaches (8). This iatrogenic disorder affects more than 1 % of some populations (9), women more than men, and some children also.

Overall, the global prevalence among adults of current headache disorder (symptomatic at least once within the last year) is 47 % (1).

No significant mortality is associated with headache disorders, which is one reason why they are so poorly acknowledged. On the other hand, among the recognizable burdens imposed on people affected by headache disorders are pain and personal suffering, which may be substantial, impaired quality of life and financial cost. Above all, headache disorders are disabling: worldwide, migraine on its own is the cause of 1.3% of all years of life lost to disability (YLDs) (10). Together, all headache disorders probably account for double this burden (1). Repeated headache attacks, and often the constant fear of the next, damage family life, social life and employment (11). Headache often results in the cancellation of social activities while, at work, people who suffer frequent attacks are likely to be seen as unreliable – which they may be – or unable to cope. This can reduce the likelihood of promotion and undermine career and financial prospects.

While those actually affected by headache disorders bear much of their burden, they do not carry it all. Employers, fellow workers, family and friends may be required to take on work and duties abandoned by headache sufferers. Because headache disorders are most troublesome in the productive years (late teens to 50s), estimates of their financial cost to society – principally from lost working hours and reduced productivity due to impaired working effectiveness (12) – are enormous. In the United Kingdom, for example, some 25 million working- or school-days are lost every year because of migraine alone (6).

Therefore, while headache rarely signals serious underlying illness, the public-health importance of these headache disorders lies in their causal association with these personal and societal burdens of pain, disability, damaged quality of life and financial cost.

BARRIERS TO CARE

Not surprisingly, headache is high among causes of consulting both general practitioners and neurologists (13, 14). One in six patients aged 16–65 years in a large United Kingdom general practice consulted at least once because of headache over an observed period of 5 years, and almost one tenth of these were referred to secondary care (15). A survey of neurologists found that up to a third of all their patients consulted because of headache – more than for any other single complaint (16). Far less is known about the public-health aspects of headache disorders in resource-poor countries. Indirect financial costs to society may not be so dominant where labour costs are lower, but the consequences to individuals of being unable to work or care for children can be severe. There is no reason to believe that the burden of headache in its humanistic elements weighs any less heavily where resources are limited, or where other diseases are also prevalent.

Yet there is good evidence that very large numbers of people troubled, even disabled, by headache do not receive effective health care (17). For example, in representative samples of the general populations of the United States of America (USA) and of the United Kingdom, only half of those identified with migraine had seen a doctor for headache-related reasons in the last twelve months and only two thirds had been correctly diagnosed (18). Most were reliant solely on over-the-counter medications, without access to prescription drugs. In a separate United Kingdom general-population questionnaire survey, two thirds of respondents with migraine were searching for better treatment than their current medication (19). In Japan, awareness of migraine and rates of consultation by those with migraine were found to be noticeably lower (20). Over 80 % of Danish tension-type headache sufferers had never consulted a doctor for headache (21). It is highly unlikely that people with headache fare any better in resource-poor countries.

The barriers responsible for this vary throughout the world, but they may be classified as clinical, social or political/economic.

CLINICAL BARRIERS

Lack of knowledge among health-care providers is the principal clinical barrier to effective headache management. This problem begins in medical schools where there is limited teaching on the subject, a consequence of the low priority accorded to it. It is likely to be even more pronounced in countries with fewer resources and, as a result, more limited access generally to doctors and to effective treatments.

SOCIAL BARRIERS

Poor awareness of headache extends similarly to the general public. Headache disorders are not perceived by the public as serious since they are mostly episodic, do not cause death and are not contagious. In fact, headaches are often trivialized as “normal”, a minor annoyance or an excuse to avoid responsibility. These important social barriers inhibit people who might otherwise seek help from doctors, despite what may be high levels of pain and disability.

Surprisingly, poor awareness of headache disorders exists among people who are directly affected by them. A Japanese study found, for example, that many patients were unaware that their headaches were migraine, or that this was a specific illness requiring medical care (20). The low consultation rates in developed countries may indicate that many headache sufferers are unaware that effective treatments exist. Again, the situation is unlikely to be better where resources are more limited.

POLITICAL/ECONOMIC BARRIERS

Many governments do not acknowledge the substantial burden of headache on society – and may even be unaware of it. They fail to recognize that the direct costs of treating headache are small in comparison with the huge indirect-cost savings that might be made (e.g. by reducing lost working days) if resources were allocated to treat headache disorders appropriately.

PURPOSE OF THE ATLAS OF HEADACHE DISORDERS

Our view of the global burden attributable to headache disorders is incomplete, whilst our knowledge of health-care resource allocation to headache is scant. The *Atlas of Headache Disorders*, a project complementary to formal epidemiological studies, is part of defining the problem to be addressed. The purposes are to create awareness and, more importantly, to inform policy so that solutions can be proposed on the basis of knowledge.

This work is a key component of the Global Campaign against Headache (22).

METHODS

The *Atlas of Headache Disorders* presents data acquired by WHO in collaboration with *Lifting The Burden: the Global Campaign against Headache* (22). Most of the information was collected in a large international survey performed from October 2006 until March 2009. Epidemiological data were compiled from published studies through a systematic review of all population-based studies performed up to May 2006 (1) and supplemented by data collected later through Global Campaign door-to-door surveys in China (23), India and the Russian Federation (24). The study by Stovner et al. provides the data sources and methodological details of the systematic review (1). The methods of the Global Campaign door-to-door surveys are described elsewhere (23, 24). Thus, only epidemiological data of sound provenance were accepted: i.e., those supported by peer-reviewed publication or, if not yet published, deriving from surveys of verifiably high quality.

QUESTIONNAIRE DEVELOPMENT

To gather the survey data in a consistent manner from each of the countries, three questionnaires were drafted, in English, by a group of WHO and *Lifting The Burden* experts. These questionnaires had similar structure but were different in emphasis: one questionnaire was intended for headache specialists or neurologists ("neurology version"), one for primary-care physicians ("GP version") and one for representatives of people with headache ("lay version"). A glossary of terms used in the questionnaires was also prepared to ensure that all respondents would understand the questions in the same way.

The questionnaires were piloted in one country in each WHO region, and changes made as necessary.

IDENTIFICATION OF RESPONDENTS

A list of respondents was built initially from the International Headache Society's membership register, European Headache Federation member-organization contacts, representatives of World Headache Alliance lay-member organizations, International Headache Congress and European Headache Congress attendance lists, World Federation of Neurology contacts (from national neurological societies) and previous respondents to WHO's data collection exercises for the *Atlas of Country Resources for Neurological Disorders* and *Atlas of Epilepsy Care in the World*. A number of geographical gaps remained; to fill these, additional contacts were found during the survey, some through other respondents and some as authors of relevant recently-published articles.

The great majority of contacts located in these ways were headache specialists or neurologists. Each of these was asked to identify, if possible, likely respondents among primary-care physicians and lay representatives known personally to them.

DATA COLLECTION

The appropriate questionnaire was sent by email, directly by the project team to each person on the respondent list and indirectly by some of these contacts to others.

Respondents were asked to follow closely the glossary definitions, in order to maintain uniformity and comparability of responses. Questions and requests for clarification were answered. Repeat invitations were sent whenever there was delay in procuring the completed questionnaire. When incomplete or internally inconsistent information was submitted, the respondents were asked for further details or clarification.

In cases of non-response after repeated reminders, simplified and shortened versions of the three questionnaires were sent.

DATA MANAGEMENT AND ANALYSIS

All possible measures were taken to compile, code and interpret the information provided by countries using uniform definitions and criteria.

As they were received, data were entered into an electronic database applying suitable codes using Stata (special edition) version 8 software.

Analyses and group comparisons were made with SPSS 17 software. Values for continuous variables were analysed for frequency distributions and measures of central tendency (means, medians and standard deviations) were calculated as appropriate. Graphics were created using medians because of the skewed distributions of most data and, in some cases, occurrences of outliers.

Countries were grouped into the six WHO regions (African Region [AFR], Region of the Americas [AMR], Eastern Mediterranean Region [EMR], European Region [EUR], South-East Asia Region [SEAR] and Western Pacific Region [WPR]) and four World Bank income categories according to 2009 gross national income (GNI) per capita (low-income: US\$ 995 or less; lower middle-income: US\$ 996–3945; upper middle-income: US\$ 3946–12 195; high-income: US\$ 12 196 or more) (25).