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Introductory Chapter: Mortality and Quality of Care Systems in LMICs

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1. Mortality and risk factors: the global picture

Mortality data is a key indicator of the health of a population, with life expectancy being a commonly reported measure. Most recent estimates (2015) place global life expectancy at birth at 71.4 years but with significant regional differences. Improvements in life expectancy over the last few decades are reflected in the 55% of global deaths which occurred among older persons 65 years and over (moving from 41% in 1990). This development is a marker of socioeconomic development and progress in the reduction of premature deaths [1].

In 2017 approximately 56 million deaths were recorded and of that number non-communicable diseases (NCDs); communicable, maternal, neonatal and nutritional diseases; and injuries accounted for 72.3, 19.3, and 4.6% of deaths, respectively [2]. Cause-specific mortality for the top 10 leading causes of death was attributed to cardiovascular diseases (32.26%), cancers (16.32%), respiratory diseases (6.48%), diabetes (5.83%), dementia (4.36%), lower respiratory infections (4.35%), neonatal deaths (3.16%), diarrheal diseases (3.03%), road incidents (2.45%), and liver disease (2.3%) [2].

Globally, the predominant risk factors for mortality are preventable and include high blood pressure, smoking, high blood sugar, high body mass index (obesity), high cholesterol, outdoor air pollution, alcohol use, household air pollution, low fruit diets, and low vegetable diet. While both men and women have metabolic and behavioral risk factors for early death and disability, the leading behavioral risk factors for men were smoking and alcohol consumption, while for women metabolic risk factors were predominant (e.g., high systolic blood pressure, glucose, and body mass index) [2]. The association between nutrition and NCDs may have arguably originated in utero [3], and an increased awareness of epigenetics has thickened the discussion around NCDs and associated mortality. Discussions on health disparities and NCDs have also become increasingly relevant, especially given global economic disparities and social risks which directly impact on the poor, marginalized and other vulnerable populations. This is oftentimes compounded by deficiencies in health literacy and inadequate integration of evidence-based models in health care.

While non-communicable diseases have largely accounted for global deaths, acute and chronic respiratory conditions remain the major threats to survival. In 2016, the top two leading causes of death in low-income countries were non-communicable diseases—lower respiratory infections and diarrhoeal diseases [2].

Among the many respiratory conditions that contribute to hospital mortality, infectious causes are reported to account for the largest proportion [4]. The Global Burden of Diseases, Injuries, and Risk Factors (GBD) Study (2015) reported in the Lancet Infectious Diseases (2017) that, worldwide, the fifth cause of death overall was attributable to lower respiratory tract infections [4]. Over 50% of these deaths (totaling 1,517,388) in all ages were attributable to pneumococcal pneumonia. The impact of this was disproportionately seen among various age groups with the greatest impact in childhood [4]. Vaccination, proper nutrition and a reduction in exposure to contaminated air were important strategies that resulted in a reduction in mortality in children [3]. Other important infectious agents associated with significant morbidity and mortality include *Haemophilus influenzae* serotype B, *Mycobacterium tuberculosis* complex (MTBc), influenza virus, and the respiratory syncytial virus with MTBc infections being among the top 10 causes of death globally [5]. Tuberculosis has had a resurgence in recent times, associated with the HIV/AIDS epidemic. Management of these conditions has been further complicated by the development of multidrug-resistant strains which further contribute to significant morbidity and mortality [5].

2. Health disparities and the growing burden in LMICs

Health disparities between high- and low-income countries are reflected in the leading causes of death in low-income countries being communicable, maternal, neonatal, and nutritional diseases compared to non-communicable diseases (e.g., ischemic heart disease, stroke, and lung cancer) in high-income countries. Lower-middle, upper-middle and high-income countries all reported ischemic heart disease and stroke as the top two leading causes of death. Notably, however, ischemic heart disease was the third leading cause of death in low-income countries, signaling an epidemiological transition [6] (**Table 1**).

The prevalence of chronic non-communicable diseases (CNCD) in lower middle-income countries (LMICs) is burdensome. Currently, three out of four people die from a CNCD, and 40% are premature, occurring between 30 and 69 years [7]. The drivers of these diseases are well documented and include both behavioral and biological factors, which are challenging to address when compounded with needed health system strengthening. Notwithstanding, the latter may be easier to address strategically through policy implementation, while the former will need an ecological approach that addresses cultural and economic nuances that are inherent in LMICs.

The economic fallout from the global NCD burden over the next 20 years is estimated at a cumulative loss output of US\$ 47 trillion, representing a value of 75% of global gross domestic product at 2010. The forces of population growth and ageing are expected to increase the number of persons affected by NCDs, thereby increasing healthcare costs and reducing productivity globally. Cardiovascular disease and mental health conditions are the major contributors to the economic burden. The largest share of the burden will be borne by high-income countries. However, the scale of the impact in developing countries will increase as a result of population growth and economic challenges [8]. LMICs are increasingly being challenged by the lack of resources and inadequate infrastructure and health systems to effectively respond to the NCD epidemic, while many are simultaneously battling emerging and re-emerging communicable diseases. Jamaica and Burkina Faso are among two of the countries classified as LMICs, albeit at different ends of the spectrum, but facing grave economic and social challenges. Experiences from both countries are shared in this book.

Rank	High-income countries	Upper-middle income countries	Lower-middle income countries	Low-income countries
1	Ischemic heart disease	Ischemic heart disease	Ischemic heart disease	Lower respiratory infections
2	Stroke	Stroke	Stroke	Diarrhoeal diseases
3	Alzheimer disease and other dementias	Chronic obstructive pulmonary disease	Lower respiratory infections	Ischemic heart disease
4	Trachea, bronchus, and lung cancers	Trachea, bronchus, lung cancers	Chronic obstructive pulmonary disease	HIV/AIDS
5	Chronic obstructive pulmonary disease	Alzheimer disease and other dementias	Tuberculosis	Stroke
6	Lower respiratory infections	Lower respiratory infections	Diarrhoeal diseases	Malaria
7	Colon and rectum cancers	Diabetes mellitus	Diabetes mellitus	Tuberculosis
8	Diabetes mellitus	Road injury	Pre-term birth complications	Pre-term birth complications
9	Kidney disease	Liver cancer	Cirrhosis of the liver	Birth asphyxia and birth trauma
10	Breast cancer	Stomach cancer	Road injury	Road injury

Source: World Health Organization [6].

Table 1.
Top ten causes of death by income group, 2016.

Burkina Faso in Africa has a population of 18,450,000 and life expectancy at birth of 60 years. Communicable diseases account for 5 of the top 10 causes of death, the top 3 of which are lower respiratory infections (14%), malaria (10%) and diarrheal disease (6%) [9]. These data reflect a country in what Omran described as the second stage of the epidemiological transition—‘Age of Receding Pandemics’ [10]—characterized by a shift from primarily infectious diseases to include non-communicable diseases such as stroke (6%), ischemic heart disease (4%), and road injury (3%) [9]. Burkina Faso is classified as a low-income country by the World Bank, with an economy which is heavily reliant on agriculture and vulnerable to external shocks and internal political instability. Ranked 144 out of 157 countries on the new World Bank Human Capital Index, Burkina Faso is severely challenged by the impact of the twin epidemics of communicable and non-communicable diseases [11].

Home to 2.9 million persons, Jamaica, the largest island in the English-speaking Caribbean, has a life expectancy at birth of 76 years and is classified as an upper middle-income economy. In spite of this, the country has struggled with low growth, high public debt and vulnerability to external shocks from global economic forces and natural disasters such as floods and hurricanes [12]. Across the Caribbean, governments are paying increased attention to the impact of NCDs on sustainable development. In the case of Jamaica, GDP output loss due to the four leading NCDs (cardiovascular disease, cancer, chronic respiratory disease, and diabetes) and mental health conditions is projected at US\$ 18.45 billion over the 2015–2030 period. As a singular factor, cardiovascular disease is expected to account for 20% of this loss [13]. Furthermore, NCDs and mental health conditions

are projected to reduce annual GDP by 3.9% between 2015 and 2030. Regional government commitment to policy and programs to address the NCD epidemic is relatively strong but challenged by economic realities.

3. Hospital mortality data systems: measuring quality of care

As the world faces a multiplicity of health challenges, the World Health Organization is following its 2019 watch list of 10 threats to global health: air pollution and climate change, non-communicable diseases, global influenza pandemic, fragile and vulnerable settings, antimicrobial resistance, Ebola and other high-threat pathogens, weak primary health care, vaccine hesitancy, dengue, and HIV [14].

Many of the deaths from these conditions and exposures occur in hospitals. Hospital mortality data is an important source of information to support health system strengthening globally by enabling monitoring and improvements in quality of care [15]. Robust public health planning requires the availability of timely and accurate data on the leading causes of death and disability.

The World Health Organization reports that cause-of-death statistics from hospital sources and other sources form the basis of statistics on the health of a population. This information is used for development planning by governments, researchers, and donor agencies and is often used to track progress on national and international development goals. However, the issue of accuracy has remained a concern in many jurisdictions. Addressing this issue requires an expanded awareness of the public health value of correct certification and coding of hospital deaths and the proper maintenance of hospital records to facilitate improved diagnoses and treatment. Continuous monitoring and evaluation of cause-of-death certification and coding and medical record practices is also necessary to support useful and effective national mortality data systems [16, 17].

Given the challenges in data quality and utilization for hospital performance metrics, experts recommend the following to improve the quality and use of hospital mortality data:

- Regular national audits of mortality with feedback to hospitals to address gaps in reporting and analysis
- Training programs for doctors and medical students on cause-of-death certification and coding
- Alignment of hospital cause-specific mortality reporting with disease surveillance and response programs
- Strengthening of maternal and perinatal death surveillance and response, focusing on lessons learned to improve quality and safety
- Capacity building for clinical and population health epidemiology to enable improved sophistication in analyses [18, 19].

4. Strategies, guidelines and lessons for LMICs

Persons requiring hospital admission are those whose illnesses require professional supervision. The book outlines strategies to enable the best possible outcome

with interventions focused on improving the health literacy of the patients and ensuring that their nutrition is optimal, ranging from the very preterm infant to end-of-life care for the elderly.

An informed consumer improves the likelihood of developing a cooperative relationship between the general public and the health team. Lynch and Franklin discuss health literacy, or the capacity of the patient to obtain, process and understand basic health information and services needed to make the basic health decisions for themselves and their loved ones. They outline what the concept of health literacy means, especially its limited prevalence, and explore possible strategies to improve its contribution to reducing hospital mortality and morbidity.

Global evidence suggest that efforts to standardize care for all patients help to improve outcomes, and as such there is a growing support for the development of clinical guidelines, which are adapted to local conditions, clear protocols for care and the use of checklists to ensure that the care process is consistent. With increasing life expectancy, few patients present with a single health problem nor is addressing even a specific problem the singular responsibility of one professional, so the building of multidisciplinary teams and improving the facility with which members of the health team work together for the good of the patient are discussed by Plummer and colleagues.

Supportive care while in hospital requires attention to optimize the contribution of adequate nutrition to the patient's recovery and health maintenance going forward. Wright argues that this requires attention to the professional, skill, knowledge and experience of the health team as these are important correlates that may modify patient outcomes. Even in well-resourced settings, this aspect of care does not receive the attention it deserves; however the authors argue that in under-resourced developed states, it is important to capitalize on this valuable asset which can assist health teams to realize positive gains in patient survival through the establishment of good policies and standards for care.

Life-threatening complications require tertiary care, including access to intensive care services. Once these units are established, we need to understand the factors associated with adverse outcomes and ensure that strategies are put in place to address those preventable complications. Martin and colleagues explore the Burkina Faso experience and lessons to reduce mortality among the elderly.

Developing evidence-based models which are contextually relevant for LMICs is critical to reducing associated burden and mortality in these resource-limited environments.

Addressing hospital mortality is a complex task and the span of issues covered in this book shows that there is a bigger frame within which all strategies should be considered. As much as the hospital is an entity strongly focused on clinical care, it remains a part of the wider health system. The book chapters cut across issues of personal risk and resource considerations to environmental exposures and policies affecting education and health literacy. Placing the strategies collectively within a broad field frame begs the question of the role of the hospital as a socially accountable institution.

While the strategies could be seen as acting upon a situation occurring within the institution, the institution as a whole must be seen as having collective responsibility and scope for action. Overall, social accountability is an effective strategy for improving the quality and performance of health-care service providers and institutions and it has been shown to have better status in private hospitals compared to public and teaching ones [20]. In low- and middle-income countries, such as Jamaica, the majority of hospital care of the population is delivered through public hospitals. As such, efforts to improve the overall social accountability must be a priority overarching strategy for reducing mortality.

A big part of such strategic intervention on social accountability in hospitals will be tied to having adequate corporate governance and corporate strategy social responsibility [21]. Stakeholders' demands must be met and there must be a culture of performance, conformance, and responsibility. Hospitals, seeking to improve health outcomes in a cost-effective manner, should consider preventive measures in developing intervention strategies. This is an important consideration around the strategies discussed in this book. Placing the hospital in a role to also address social determinants [22] may seem a misfit with its core mission. However, if real gains are to be made in LMICs with limited resources and the threat of stagnation within the epidemiological transition, a socially accountable framework must be considered to bring synergies with the overall health system and much needed and added value to individual strategies.

The issues covered in the book create a framework from which policies may be developed to improve the prevention and management of disease, with the hope of reducing the associated hospital mortality.

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