

Mortality in the developing world- Can pharmacists intervene?

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ABSTRACT

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The ever mounting challenge facing global health today is the wide spread gap between the life expectancy observed in the developed and the developing world. War, famine, communicable and non-communicable diseases challenge sustainable development of the human health in the impoverished 3rd world nations. Mortality of the population is mainly influenced by the economic, social and technological advances taking place in a nation. In contrast to the healthy lives enjoyed by the inhabitants of Monaco with a highest life expectancy of 90 years, people of Swaziland experience a life expectancy of only 32 years which is the lowest in the world. A majority of the people in the developing nations fall prey to life threatening diseases and infections. This paper provides a comprehensive summary of the causes of mortality among children, adults and older adults across different continents. Independent pharmacies in developing nations can play an important role in reducing mortality, providing continuity of care, improving life expectancy and public health in areas where high health disparity exists. Personalization provided by the pharmacists can improve medication adherence, identify health needs and inspire people to improve their health.

Keywords: mortality trends, life expectancy, WHO, global health, developing nations

INTRODUCTION

Poor medication adherence for chronic conditions can lead to considerable morbidity and mortality in patients.^{1,2} The technological and medical advances in healthcare become suboptimal if patients are non adherent to their treatment regimens. In case of hospitalized patients with chronic cardiovascular conditions, medication adherence rates start falling after the patients are discharged. Researchers also found, according to self reports, that only 10% of the discharged patients were completely adherent to their cardiovascular treatment regimens.^{3,4,5,6} Sometimes, when a medication is prescribed, the physician might not explain the directions of the medications properly leading to misunderstanding and failure of medication intake on the part of the patient. On the other hand, patients with chronic conditions might miss a dose or take it at the wrong time and

forget to disclose this before their physicians. It is challenging to ensure medication adherence in a particular patients since it cannot be detected by laboratory or blood tests. Physicians and pharmacists can play complementary roles with regards to provision of medication education to the patients for enhancing medication adherence.⁷ Complex drug regimens, high drug costs, lack of patient education and adverse drug events are some of the barriers that hinder medication adherence. To overcome these barriers and to motivate the patients to be more adherent to their medications, pharmacists can simplify the patient's treatment therapy. Pharmacists can influence self care behaviors of the patients by playing a key role in assessing, planning and strategically implementing their therapy. Medication adherence might be high in patients who receive counseling compared to patients who do not receive counseling. In the developed nations, pharmacists provide counseling about vaccination, sexual health, smoking cessation and weight management, thereby equipping patients with the healthcare and infrastructure they require to maintain a healthy lifestyle.^{8,9,10} Education provided by the pharmacists about complex therapy, side effects of drugs,

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potential adverse events, usage of once daily agents, therapy maintenance can help improve self care and health outcomes in patients.⁷

Life expectancy

Every nation has a social and economic divide influencing the social and economic status of its residents. Social and economic status combined with the political environment has a great influence on the mortality trends of a nation. The WHO has noted a trend during the past 3-4 decades characterized by a rise in the life expectancy observed in developed nations and most of the developing nations, barring a few nations showing a plateau or a decrease. Here is an overview of some of the nations who have witnessed stagnation or decline in life expectancy.

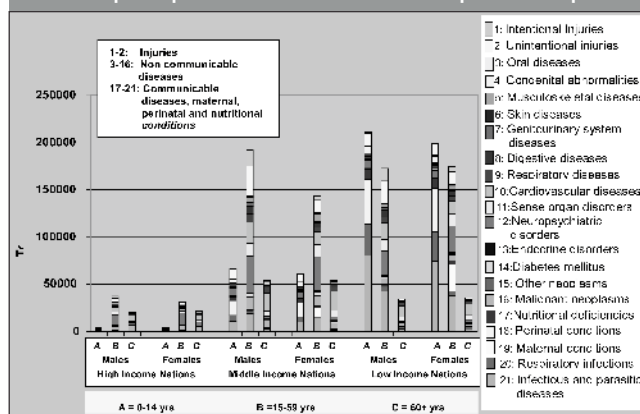
Mortality in children

Child mortality has gone up in Sub Saharan Africa due to poverty, infectious diseases like HIV/AIDS, rise in malarial mortality, lower respiratory tract infections, diarrhoeal diseases, malnutrition, increase in mother to child transmission of HIV/AIDS, rise in maternal mortality due to HIV/AIDS, stretching away of the resources from child health programs to treat other HIV/AIDS patients, civil unrest and social anarchy. Life expectancy of the children in developing nations of Eastern Mediterranean Region, Latin America and Asia has also declined primarily due to perinatal conditions including birth asphyxia, birth trauma and low birth weight. It has been observed in some South East Asian nations like India, China and Nepal that new born girls have a higher risk of dying due to poor access to health care and the prevalence of stigma that only men are breadwinners in the family. Also, higher rates of child mortality especially female infanticide are witnessed in the rural areas of the developing nations with concentration of poor and illiterate crowd as opposed to educated and informed crowd in the urban areas.^{11,13}

Mortality in adults

Non communicable diseases and injuries (higher prevalence in males) play a major role resulting in adult mortality in many developed nations. The reason for reversal in the adult life expectancy in Africa and some of the developing nations is due to premature adult deaths caused by injuries incurred in war and violence along with the double burden of non communicable and communicable diseases, mainly infectious diseases like HIV/AIDS and parasitic diseases like malaria and tuberculosis which have led to serious

Fig. 1: Total DALYs [Disability adjusted life years (per 1000)] by age group, sex and causes in 192 nations grouped by income per capita across the world: WHO Report- 2004 update.



socioeconomic disparities and political unrest in these regions (figures 1 and 2). On the other hand, even though the life expectancy of adults in developing nations is higher, many poor adults are susceptible to higher disease burden and disabilities. There is an almost 12 fold mortality gap as a result of the improving life expectancy in developed world and deteriorating life expectancy in the developing world.^{11,13}

Mortality in older adults

Emerging epidemic of non communicable diseases marked by the incidence and prevalence of chronic conditions like cardiovascular diseases, cancers of the stomach, liver and colon/rectum, lung cancer caused by smoking, and neuropsychiatric disorders are some of the major contributors augmenting the burden of disease and disability in low-income and middle income nations. The DALYs (Disability adjusted life years)/ YLDs (Years Lived with Disability) that account for reduction in life expectancy rate are defined by WHO as “The sum of years of potential life lost due to

Fig. 2: Number of deaths (in thousands) by age group, sex and cause in 192 nations across the world grouped by income per capita: WHO Report- 2004 update.

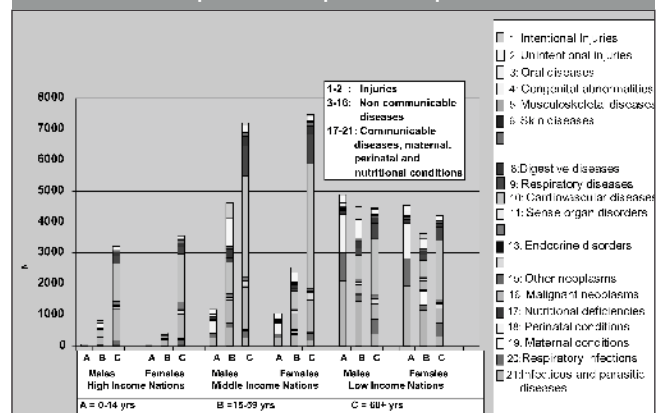


Table 1: Mortality and life expectancy patterns seen in different age groups in various developed and developing nations over the past 2 decades:

Nation	Life expectancy at birth (years)			Healthy Life expectancy (HALE) at birth (in years)	Neo natal mortality rate (per 1000 live births)	Infant mortality rate (ages upto 1) (per 1000 live births)			Under five mortality rate (ages upto 5) (per 1000 live births)			Adult mortality rate (ages 15-60) (per 1000 population)			Reasons for stagnation or decrease in life expectancy
	1990	2000	2008	2007	2008	1900	2000	2008	1900	2000	2008	1990	2000	2008	
China	68	71	74	66	11	37	30	18	46	36	21	172	135	113	War and famine in 1959-1961
Europe	72	72	75	67	7	27	18	12	32	22	14	157	165	149	Industrialization from 1930s – 1950s
USA	75	77	78	70	4	10	7	7	11	9	8	132	114	107	Industrialization from 1930s – 1950s
Russia	69	65	68	60	6	17	16	9	21	20	11	218	309	273	Decline in male life expectancy after 1965 due to heavy alcohol intake, injuries, violence, social unrest, people affected by inadequate government and decades of failures of communism, inefficient Soviet health-care system in 1990s
Sub Saharan Africa	51	50	53	45	40	108	98	85	182	165	142	371	421	392	rapid spread of HIV/AIDS, numerous human losses, many regions are stricken with poverty, illiteracy, war and violence, widespread prevalence of multiple partner induced HIV/AIDS, racial and gender disparities, poor access to medical care systems, rebounding tuberculosis and malaria since 1980s
Uganda	47	45	52	42	31	114	98	84	186	158	135	475	600	436	High prevalence of HIV/AIDS
Rwanda,	50	45	58	43	35	106	112	72	174	186	112	408	547	303	Ongoing war, political upheaval
Angola	42	44	46	45	47	154	141	130	260	238	220	489	460	421	instability
Zimbabwe	61	44	42	39	28	51	62	62	79	102	96	285	711	772	Ongoing economic and social
Kenya	60	51	54	48	33	68	81	81	105	128	128	267	463	371	upheaval affecting child health, development and survival
North Korea	73.2	70.7	67.2	59	29	42	42	42	55	55	55	193	194	196	widespread famine from 1995- 1998, political instability
West African nations like Sierra Leone	41	41	49	35	45	163	151	123	278	252	194	469	530	393	Ongoing serious political conflicts with other nations and within the nation, political and economic instability within the nations
Côte d'Ivoire	54	53	56	47	41	104	96	81	150	138	114	329	399	361	
Liberia	36	50	54	48	44	146	118	100	218	174	144	717	390	340	
Haiti	54	58	62	54	25	105	78	54	151	109	72	336	311	267	rebounding tuberculosis and malaria since 1980s

Source: reference 11,12.

premature mortality and the years of productive life lost due to disability".¹⁵ Even if the prevalence of non fatal conditions like neuropsychiatric disorders is more in developed world, the DALYs/YLDs combined with the severity of the disorder is far higher in high mortality nations (figure 1). As a result, older people in developing nations spend a major portion of their lives in poor health due to insufficient mental health infrastructure, prevalent stigma, lack of policies for mental health care and reduced medication adherence to the existing co morbid chronic conditions, ultimately leading to early death compared to their wealthy peers in developed nations.¹³

HALE (Health Adjusted Life Expectancy)

WHO defines HALE as "Average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury".¹⁶ As stated by Mathers and colleagues¹⁷, lower levels of compression of morbidity might also be one of the reasons for developing nations to have higher mortality and lower life expectancy compared to developed nations. "Compression of morbidity" is a hypothesis by Dr. James Fries which states that the burden of lifetime morbidity can be compressed if the age of onset of first chronic condition is delayed in a person. Higher compression of morbidity reduces healthcare costs and improves overall health of the patients over time.^{18,19,20} Disability also has a greater impact on the HALE of a person living in a developing nation due to lower socioeconomic status, prevalence of high number of co morbidities, poor access of health care, physical and social surroundings, unhealthy behavior/lifestyle and substance abuse.¹⁷

Technological advances

In the wake of the technological advancements, unequal access to health-care advances, rising poverty, socioeconomic gradient within the nation, vicious cycle of war and injury resulting in death prevent global convergence among the developed and developing nations. Misallocation of resources, rebounding infectious diseases like malaria and tuberculosis, emergence of resistant malarial parasites, impaired health status, improper diet, increase in prevalence of HIV/AIDS, obesity, type 2 diabetes, smoking, alcoholism and environmental health risks have impacted the healthcare systems in the developing nations.¹¹ Cheap health care technologies can be very beneficial in developing nations where there is a scarcity of healthcare professionals and lack of funds to provide employment to a large healthcare workforce. Modern medical equipments and technology also

prevents medication errors and deaths which mostly occur when patients are treated by untrained and non professional health workers. One of the criticisms of healthcare technology is the fact that most of the modern medical equipments are developed in affluent western nations and the needs of the developing nations are ignored while manufacturing. In order to make healthcare technology accessible and usable in the developing nations, construction of affordable medical equipments developed by local engineers and operated using the technology and infrastructure available in the developing nations is necessary. Even though projects involving the use of healthcare technology are initiated successfully in developing nations by western researchers, some of these projects shut down gradually due to lack of infrastructure and available funds.²¹

Retail pharmacies in developing nations:

In developing nations like India, retail pharmacies are the most valuable resources for procuring cheap pharmaceuticals, obtaining health advice, easy access of pharmaceuticals with minimum waiting time, obtaining pharmaceuticals on credit basis and ease of obtaining desired quantities of pharmaceuticals. The method of distribution of pharmaceuticals for the majority of pharmacies on the other hand is less likely to be standardized or regulated.²² Pharmacies in poorly developed urban areas or rural areas recruit minimally trained pharmacists or non pharmacists giving rise to establishments housing officially employed but physically absent pharmacists. The existence of investor owned pharmacies lacking professionally trained pharmacists and pharmacist owned pharmacies next to each other not only influence the consumer's choice for purchasing drugs but impact pharmaceutical regulation. Many pharmacists also have biased drug information mostly passed on by medical representatives working for small pharmaceutical companies. In rural areas, the villagers due to social perceptions, on many occasions feel empowered to self prescribe and demand certain types of treatments only.^{22,23,24,25} Medical malpractice to gain financial profits is very common both in the public and private hospitals in India.²⁶ It is necessary to identify and deal with the existent barriers in the healthcare system that impedes the dissemination of quality pharmacy services in developing nations. Considering the contribution of pharmacists towards public health, the Indian government should include them in national public health programs. It should also attempt to promote high standards of care by regulating the practice of pharmacy.²⁷ Some areas in

retail pharmacy requiring regulation in the developing nations are distribution of pharmaceuticals in the private sector, much needed staff education, appropriate drug substitution, incorrect drug prescribing, self prescribing, mandatory information provision, control on profit margins of pharmacies and unchecked sale of non OTC drugs.^{22,28} Due to the human resource crisis in the developing nations, migration of professional healthcare work force including pharmacists to the developed nations is rampant, thereby hampering the provision of adequate and professional healthcare services in the home nation. The Indian government should promote initiatives involving exchange programs whereby the Indian pharmacists travel abroad and pharmacists from the developed nations travel to India in order to gain and exchange professional expertise.²⁹

Regulation of pharmaceuticals

The high disease burden seen in the developing nations promises many financial gains for pharmaceutical manufacturers, drug sellers and medical practitioners. However, irrationality in the distribution and prescription of pharmaceuticals is witnessed in the developing nations. People in most need of pharmaceuticals don't have access to it and if they do have access, then inappropriate or unnecessary pharmaceuticals are prescribed for them³⁰. This paradox calls in attention for drug regulation in the developing world. The pharmaceutical companies dump their expired pharmaceuticals in many African nations or they sell pharmaceuticals in one nation but they do not sell in another nation. Some companies also sell pharmaceuticals to developing nations for indications that are different than that used for in their own nation. This occurs because the recipient nation does not have efficient healthcare systems to protect their citizens. Primary healthcare systems should be suited to the local lifestyles and characterized by timely access to healthcare, drugs and vaccines. India spends more on tobacco compared to healthcare.³¹ Allocating sufficient resources for adequate research on endemic diseases, preventing drug dumping, preventing sale of expired pharmaceuticals, preventing over the counter sale of prescription drugs and ensuring that drug labels are fair, accurate and consistent with the manufacturing nation, are some of the measures that can ensure drug regulation.^{31,32} The International Code of Pharmaceutical Marketing Practice (IFPMA) states that "The pharmaceutical industry, conscious of its special position arising from its involvement in public health, and justifiably eager to fulfill its obligations in a free and fully responsible manner, undertakes to ensure that all products it makes

available for prescription purposes, have full regard to the needs of public health".³² Evidence based promotional drug communication, regulating drug pricing, encouraging people to actively promote and safeguard their own health, building of successful pharmacist and healthcare provider partnerships, more use of generics instead of brand drugs and prescription of essential pharmaceuticals only can help control healthcare costs and narrow high profit margins of the pharmaceutical companies.^{30,31,32} Absence of drug regulation in developing nations endangers their public health, encourages drug misuse and improper resource utilization and weakens their healthcare system by increasing the healthcare disparities among their rich and poor populations.^{30,32}

Care in inaccessible areas:

For the purpose of providing care to the poor and under deserved populations residing in inaccessible areas in developing nations, medical mission teams travel from urban areas or from other developed nations. These teams have a demand far greater than availability and consist of physicians, surgeons, dentists, nurses, pharmacists and others. Pharmacists fill an important niche in this mission field work by providing their high quality services and knowledge about drug products, drug usage, storage, labeling, dispensing, therapeutic substitution, patient consultation, drug regulation and organized workflow and maintenance of medication.^{33,34} Unlike shopkeepers and tradesmen, pharmacists have high education and are more driven by professional values rather than commercialism. In many developing nations, pharmacists adapt their role to meet the needs of the local people. At times, in rural areas, amidst a shortage of physicians, pharmacists use their skills to make independent diagnosis and prescribe drugs in serious situations.^{35,36,37} Advancement of good health, prevention of ill-health and the attainment of health objectives and maintenance of medication quality are some of the important elements of Good Pharmacy Practice (GPP). In order to achieve the important elements of GPP, it is important that pharmacists have licensure to practice pharmacy and regulate drug quality. Drug quality should be controlled by storing and selling it in properly marked containers, having information about its importer and producer, monitoring its expiration and avoiding its mixing.³⁸ Rural areas in developing nations are characterized by shortage of licensed professionals including pharmacists. Better public health and regulated drug supply can be achieved in rural areas by educating non licensed drug sellers who are the main sources for obtaining

pharmaceuticals.³⁹ Successful interventions have been facilitated to augment GPP by enforcing educational and regulatory reforms among pharmacists in Laos and Vietnam.^{38,40} The success of many vertically designed disease control programs depends on strong and sustainable healthcare systems characterized by availability of trained healthcare workforce and equal and consistent access to pharmaceuticals.⁴¹

Social pharmacy

Successful implementation of healthcare interventions requires patient support along with professional expertise. India is the largest democracy in the world and has several castes, communities, ethnicities and tribes. It is important for pharmacists as professionals to socially abide by and consider peoples' opinions, views and perceptions about health and medication usage while designing and implementing treatment regimens.⁴² In conjunction with social beliefs, educational level is found to be directly correlated with higher life expectancy.⁴³ A study assessing the impact of social and cultural beliefs held by patients on their healthcare decision making found that child mortality was very low in the state of Kerala in India. The authors found that social service network, family planning, high literacy among the population and special techniques employed for child care were some of the main factors contributing to lower child mortality in that region.⁴⁴ On the other hand, recognition is a bidirectional need. In a system where it is important to recognize the needs of the patients coming from varied backgrounds, recognition of pharmacists by other professionals is also equally important. Pharmacists are integral part of communities they serve and many patients go to them for healthcare advice in India in order to save costs associated with physician visits. In spite of this, they are viewed as mere product suppliers.^{45,46} Nevertheless, one of the major issues facing the Indian pharmacists and pharmacists in other developing nations is the lack of recognition as professionals by other healthcare professionals like doctors and nurses.^{45,47,48} There are many people in developing nations that practice self medication and lay people who consider their physician's prescription as blue print without ever questioning it.⁴⁶ In India, the positionality of pharmacists is being questioned with regards to management of chronic conditions and so far their expertise has been under utilized in designing national public health campaigns, interventions and promotions. Ghana, a third world nation in Africa now uses the pharmacist services for management of STIs and HIV/AIDS.⁴²

Use of electronic care and telecommunication:

In developed nations like USA and Canada, usage of electronic media and telemedicine by physicians and pharmacists have led to reduction in the overall health costs incurred by patients, time spend by physicians and emergency department visits as well as an improvement in therapeutic outcomes, medication adherence, healthcare quality, post-surgical medical support, treatment of patients in rural areas and chronic disease management for mood disorders, diabetes mellitus and mental disorders.⁴⁹ A meta-analysis study assessing the impact of mobile phones to improve health outcomes globally illustrates that unlike developed nations, developing nations need sufficient evidence about the cost effectiveness of value based telecommunication and improvement in the medication adherence of patients suffering from TB, HIV and non communicable chronic conditions. One of the reasons that could be the fact that ownership of mobile phones is shared in many developing nations as opposed to individualized in developed nations.⁵⁰ A study conducted in 10 primary health centers located in East India provides evidence that healthcare professionals are eager to use e-health and information communication technology (ICT) to deliver healthcare services more efficiently. However, system failures comprising of the lack of ICT infrastructure, absence of broadband network 24/7, power shutdowns and lack of funds to purchase computers and related accessories hinder this process.⁵¹ Pharmacists in India are less likely to use ICT compared to physicians and nurses. Gour et al. (2010) studied the knowledge of computers among pharmacists and found that they used computers mostly for internet, email or for entertainment purposes due to lack of orientation towards using technology for healthcare delivery services. The Ministry of health in India has planned initiatives for launching nationwide telemedicine and e-health tools as part of their 11th 5 year plan, most of these initiatives are mere pilot programs.⁵²

CONCLUSION

HIV/AIDS, rebounding malaria, tuberculosis, the double burden of other communicable and non communicable diseases and injuries causing disability are the major causes of premature deaths of children, adults and the elderly population. Halting or reversing the spread of HIV/AIDS, malaria and TB in every nation across the globe are some of the major health related initiatives started by the WHO as part of the Millennium Development Goals (MDGs). Barring a few nations with a stagnant or negative progress, most of the developing nations are progressing towards the fulfillment of

these initiatives. Formulating sustainable health policies require the collective participation of the WHO, the developed and the developing nations. Measures to ensure that the people in these nations are provided with better housing, sanitation, adequate access to health care and medical facilities, education, employment and food are necessary to alleviate poverty, disease and mortality. Disease burden largely influences morbidity and mortality in people. Poor medication adherence can result in worsened health outcomes, rehospitalization and increase in disease severity. Simplified therapies consisting of increased use of once daily life saving agents can improve medication adherence and save healthcare costs. Optimum chronic disease treatment monitored and regulated by pharmacists can not only improve patient's quality of life but also reduce the disease burden and mortality in developing nations.

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