The Economic Burden of Hypertension among Older Persons: Lessons from a Developing Nation

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ABSTRACT

**Background:** Three out of every four hypertensive persons live in developing countries where they contribute significantly to increased healthcare consumption and disability; this is particularly true amongst older persons. With a rapidly ageing population, the economic burden of hypertension (HTN) in Jamaica is projected to continue trending upwards with significant implications for healthcare costs in an economy experiencing low growth. Estimating the economic burden of HTN is, therefore, important from a planning and mitigation perspective.

**Methods:** Cost analysis methods were undertaken to estimate absolute costs, in both direct and indirect terms.

**Results:** Absolute economic burden was estimated at US$204.7 million; direct cost was $116.2 million (57%) and the indirect was $88.5 million (43%). Major cost drivers were laboratory investigations (29%), medications (18%), hospitalization (5%), and consultations (4%). Indirect costs were driven primarily by the need for a caregiver ($71.4 million); this need was the largest overall driver of HTN cost at 35%. Over 2,400 productive years were lost from this population at an estimated cost of $17.1 million. The burden amongst this sub-population represents 27.6% of Total Health Expenditure and per capita health expenditure of almost three times more than the general population.

**Conclusions:** The economic burden of HTN amongst older adults is high for both the country and for individuals. This burden stresses an already resource-stretched, underfunded health sector reducing its ability to provide quality care and acting as one additional barrier to the goal of universal health coverage. Exploration into policy measures to address this burden is, therefore, critical.
INTRODUCTION

Population ageing poses several challenges to countries at a macro-economic level. The health of older persons can also be challenging as they have greater health and long-term care requirements. Older adults (persons 60 years and over) are disproportionately affected by chronic non-communicable diseases (CNCDs) and their sequelae. Globally, CNCDs in older persons account for 23% of the burden of disease, though they only account for 11–13% of the population [1]. Population ageing is expected to consistently drive the CNCD burden higher, with projections of continued increase up to 2050 [2]. Ageing populations are associated with the increased CNCD burden and utilization of healthcare services, especially resource-intensive ones, thus increasing the cost for care provision in this group. As such, the expected proportional and absolute increase in the older population (and by extension CNCDs) will have significant implications for the provision and funding of healthcare, irrespective of who the payer is. Effective planning and decision making at national and regional levels will require increased effort to provide information related to disease burden, cost drivers and the relative benefits of potential interventions [3]. This is especially needed in developing countries where evidence related to these aspects of care are many times understudied [4].

Hypertension (HTN) is among the most prevalent CNCDs worldwide and Jamaica is no exception [5,6]. It is a significant preventable and modifiable risk factor for other CNCD’s such as stroke, heart disease, dementia and renal disease which themselves constitute high burden in older populations [7,8]. HTN is associated with increased risk of morbidity and mortality, with much of this being due to its association with cardiovascular, cerebrovascular and kidney diseases [9]. As the third leading cause of disability, HTN is of great concern to the health outcomes of ageing populations [10] and for the provision of subsequent care.

In Jamaica, international trends hold as the prevalence of hypertension is 25.2% in the general population [11] and more than twice (61.4%) among older adults [12]. The rate amongst older Jamaicans has increased by over 41% in the past 20 years [12]. The Ministry of Health (MOH), through its no-user-fee policy (in public health facilities) and drug subsidy programmes, absorbs a significant proportion of the costs associated with the provision of care for HTN and other CNCDs. The country’s National Health Fund (NHF) manages two drug subsidy programmes; one targets over 20 prevalent CNCDs in the general population (NHF card), while the other specifically targets CNCDs in older adults – Jamaica Drugs for the Elderly Programme (JADEP). The NHF card on average subsidizes approximately 80% of the cost of drugs for card holders [13]; the JADEP card offers medications free of charge on a monthly basis, though a nominal ‘service’ charge of approximately US$0.33 is attached to each drug dispensed [14]. Additionally, drugs on the public sector’s Vital, Essential and Necessary (VEN) list is provided to patients without charge at public pharmacies once prescriptions are written by an authorized public sector physician. Public financing of the no-user-fee and the drug subsidy initiatives comes at a tremendous cost to this developing state, with the costs of maintaining these programmes expected to increase substantially as CNCD burden increases and the population ages.

In Jamaica, the economic burden of HTN and other CNCDs is borne not only by the public sector, but also to a significant extent by individual patients and families [15]. While relatively high, the government’s contribution to healthcare still leaves many financing gaps, which fall on individual patients to bear, which for older persons is often the family. Average per capita out-of-pocket (OOP) healthcare expenditure at the time of this study reflected 25% of the annual Total Health Expenditure (THE); this is substantively high considering the efforts of the government to remove user fees from the public health system as a step towards universal health coverage. If worldwide trends are to be assumed, this high OOP cost is likely to disproportionately burden the poor and the medically vulnerable. As in many countries, the aged in society are many times both of these, leaving them particularly vulnerable to this economic burden and increasing their risk of destitution due to health related factors. The latter can also put the entire family into poverty.
The situation of Jamaican older adults is no exception, and rather mirrors the situation of many developing countries where financial preparation for retirement is often inadequate. This is due to multiple factors including informal employment during their working years, under employment, low uptake of health insurance, and low or no pension coverage [16-18]. This is compounded by high inflation rates (8%) [19] which devalue accumulated savings of older persons as well as the purchasing power of their pensions. It is important to note that these resource-limited older adults who are many times on a fixed income are also faced with other significant health-related costs such as that for diet modification, caregivers, and drugs and services which are not covered by government schemes [15].

At present, there is limited data on the economic burden of hypertension in developing countries to support policy and decision making. With ageing and HTN trends projected to continue increasing, and considering the heavy burden they place on both macro- and micro-economies, analyses focused on the cost drivers associated with this pandemic are critical. This paper analyzes the direct and indirect costs of HTN among older adults in Jamaica - a developing country with a rapidly ageing population. It seeks to identify the cost drivers of HTN, and to quantify the economic cost given the current disease burden in older adults. The findings presented in this paper will be useful for Jamaica and other developing countries with a similar HTN burden and economic profile. Understanding the impact of cost drivers of the HTN pandemic will provide useful information regarding opportunities for possible interventions that may reduce costs, allow scarce resources to be more efficiently diverted and to ultimately improve quality of care and life for older adults.

MATERIALS AND METHODS

Assessment of the economic burden of HTN among older persons was based on the demographic profile of the elderly in Jamaica (derived from a nationally representative survey of older adults which was used to generate health profile and health services utilization), Ministry of Health Guidelines, and from prevailing market costs for healthcare products and services. In 2012, a nationally representative, community based survey was conducted among 2,943 persons 60 years and older living in Jamaica. The full survey methodology has previously been described [12] and is summarized below.

Study Population and Sampling Method

Participants resided in four parishes for which the demographic and social characteristics are representative of rural and urban Jamaica [20]. Study participants were selected using a two-stage cluster sampling technique with probability proportionate to size, where parish enumeration districts and households were used as the first stage and second stage clusters, respectively.

Data Collection and Instruments

Trained interviewers administered a questionnaire to participants on a face-to-face basis. Knowledgeable caregivers and/or family members served as proxy respondents for eligible participants who were unable to communicate with interviewers. The 197-item instrument focused on health and social status, and captured demographic information, health service utilization patterns, health insurance coverage, and the presence of doctor-diagnosed chronic diseases, including hypertension.

Demographic Variables

Age was recoded into an ordinal variable with three categories: 60-69, 70-79, and 80 and over. Highest educational level was reported as an ordinal variable comprising four categories, namely: none, primary, secondary, and post-secondary. Persons who were married or living as married were classified as being “in union” while those who were single, divorced, or widowed were classified as “not in union”. Retirement status was recorded as a binary variable: “Retired” or “not retired”. Place of residence was described as “rural” or “urban” according to the official designation of the area by STATIN.
Economic Assessment

Using the elder survey data, the age- and gender-specific distributions of the occurrence of HTN were analyzed among the respondents using 10-year age groups. These distributions were then applied to the entire population of older persons to estimate the prevalence of HTN by age and gender. This provided an estimate of the number of older persons affected by the disease. Costing of the burden of disease for HTN was then based on this estimated affected population. The economic burden estimate consisted of direct and indirect costs. Direct costs comprised of the cost of hospitalization for HTN-related admissions, cost of consultation, cost of medication, and cost of laboratory and other investigative procedures. Indirect costs comprised of the imputed cost of premature mortality and the cost of caregiving associated with morbidity.

Direct Costs

The elder survey formed the basis of establishing service utilization for the direct cost components. For both genders, the percentage of respondents who indicated being hospitalized, visiting a doctor, or using the various itemized medications was applied to the population of older persons to generate the population needing care for each of these direct cost items. In the case of investigative procedures, a standard set of tests was developed based on information garnered from the treatment protocol in the public health system, clinical literature and opinions of practitioners. It was then assumed that everyone who had visited a doctor during the year for HTN-related out-patient visit would have undergone this set of tests.

The unit costs of hospitalization and consultation at the national teaching hospital (i.e. The University Hospital of the West Indies) were used for estimating costs. These unit costs were multiplied by the estimated total number of hospitalization and out-patient visits to arrive at the cost of hospitalization and consultation, respectively. Average unit costs of drugs from private pharmacies were used to cost medications. To estimate the cost of each medication, the unit cost was multiplied by the dosage and the estimated number of older persons taking it among the population. Likewise, average unit costs of tests from private laboratories were used to estimate costs of investigative procedures. For each procedure, the unit cost was multiplied by the estimated number of older persons for whom the test was recommended and the frequency of the test.

Indirect Costs

In the case of indirect costs, the WHO life table for Jamaica was used to estimate the life expectancy at 5-year age intervals starting from 60-64 years. Although the official retirement age in Jamaica ranges between 60 and 65 years, survey data indicated that on average older persons were economically active until age 70. Therefore, an age limit of 70 years was used to determine years of productive life lost due to premature mortality. Since life expectancy for the age group 70-74 was positive, using this criterion, any person who died due to HTN before age 70 would have contributed to lost productivity. These lost years of productive contribution to the economy were valued at 80% of the per capita GDP (approximately US$5290). This was done to account for decline in productivity that is likely to come with ageing.

Mortality data due to HTN by age and sex were provided by the MOH and used to determine the number of premature mortalities as a result of HTN. This information was then used to estimate the years of productive life lost by multiplying the number of deaths in an age group by the expected life expectancy for that age group. The product was then multiplied by the proportion of the older persons in that age group who indicated that they were still employed full-time or fully engaged in an economic activity. To arrive at the mortality cost estimate, we multiplied the total years of productive life lost by the weighted per capita GDP.

The estimated cost of morbidity was entirely ascribed to caregiving. The elder survey provided data on the percentage of respondents who required the services of a caregiver daily. Applying this proportion to the total population, we estimated the number of older persons requiring the services of a caregiver. The cost of caregiving was valued at the minimum wage rate of J$5600 or US$62.91 per week. All costs were estimated on an annual basis and represented
the economic burden of HTN in older persons in Jamaica for 2012 based on the 2011 census figures. Note that the conversion of Jamaican dollars into US dollars was based on the Bank of Jamaica statistics, of US$1 being equal to J$89.01 in 2012.

Statistical Analyses

Data were analyzed with Statistical Package for the Social Sciences (SPSS) and Microsoft Excel.

RESULTS

Demographic Profile

The overall study population of 2,934 older adults had marginally more women than men (52.1% versus 47.9%). The age group 60-69 represented the largest proportion (44.2%) (Table 1). The study prevalence of self-reported, doctor diagnosed HTN was 61.4% (n=1,800). Applying this prevalence rate to the wider Jamaican over 60 population resulted in an estimated total of 218,479 older persons suffering from HTN in 2011. Table 1 also illustrates a comparison of demographic variables by hypertension status. A significantly larger proportion of women reported being diagnosed with HTN than their male counterparts (72.5% versus 49.2%; p<0.001), while a larger proportion of retirees reported a HTN diagnosis than non-retirees (65.7% versus 47.4%; p<0.001). The middle-old (70-79 years) was the age group with the largest proportion (68.5%) of persons having HTN; the young-old had the lowest proportion (54.8%) (p<0.001). Educational level, union status and geographic residence were not significantly different between persons with and without HTN (p>0.05).

Economic Burden of HTN

a) Direct Costs:

The direct costs of HTN were related to hospitalization, provider consultations, prescription drugs and laboratory investigations as shown in Table 2. HTN direct costs among older persons in Jamaica (in 2012) amounted to US$116.2 million (57%) of the total economic burden of the condition. In terms of hospitalization, approximately 55,200 older persons were estimated to have been hospitalized for HTN-related conditions, accounting for a total of 386,342 hospital days at an estimated total cost of US$10.9 million. In addition to hospitalization, an estimated 170,000 older persons made approximately 516,000 provider consultations during the year, at a cost of US$8.7 million (US$50.56 per capita). An estimated 175,000 prescriptions were filled for the major drugs used in treating HTN; the cost of these drugs was estimated at a total of US$37.0 million or US$215.39 per capita. The direct cost of laboratory investigations was estimated at a total of US$59.6 million or a per capita cost of US$346.54.

b) Indirect Costs:

Caregiver/morbidity costs and costs associated with premature mortality due to having HTN constituted indirect costs as shown in Table 2. HTN indirect costs among older persons in Jamaica (in 2012) amounted to US$88.5 million or 43% of the total economic cost of the condition. An estimated 21,839 older persons were provided daily caregiving in 2012 at a total cost of US$71.5 million and an annual per capita cost of US$415.49. In terms of mortality, a total of 2,432 productive life years were lost to HTN from premature deaths among older persons in 2012; this loss was valued at US$17.06 million.

The cost of caregiving represented the highest cost driver (35%) of the economic burden of disease (Figure 1). This was followed by the cost of laboratory service (29%) and the cost of medication (18%). On an average, taking care of a senior citizen with HTN in 2012 was at an annual per capita cost of US$1190.28.

DISCUSSION

Almost two thirds (61.4%) of the older population has been diagnosed with HTN. Not only is the HTN prevalence high, its economic impact is also high, with an estimated annual economic burden of US$204.7 million (based on 2012 estimates). This burden represents 27.6% of THE in 2012 [21]; this burden is considerable as it represents delivery of care to only one subset of the national population and for only one disease. Annual per capita spending for this
### Table 1. Socio-Demographic Profile of the Study Population

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Overall Population (%, n)</th>
<th>Ever Diagnosed with Hypertension</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No (%, n)</td>
<td>Yes (%, n)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>47.9 (1,406)</td>
<td>50.8 (714)</td>
<td>49.2 (692)</td>
</tr>
<tr>
<td>Female</td>
<td>52.1 (1,528)</td>
<td>27.5 (420)</td>
<td>72.5 (1,108)</td>
</tr>
<tr>
<td>Age groups (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60–69</td>
<td>44.2 (1,285)</td>
<td>45.2 (582)</td>
<td>54.8 (705)</td>
</tr>
<tr>
<td>70–79</td>
<td>33.8 (984)</td>
<td>31.5 (311)</td>
<td>68.5 (676)</td>
</tr>
<tr>
<td>≥80</td>
<td>22.0 (641)</td>
<td>35.8 (231)</td>
<td>64.2 (414)</td>
</tr>
<tr>
<td>Highest education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5.7 (165)</td>
<td>43.0 (71)</td>
<td>57.0 (94)</td>
</tr>
<tr>
<td>Primary</td>
<td>72.0 (2,096)</td>
<td>38.3 (806)</td>
<td>61.7 (1,296)</td>
</tr>
<tr>
<td>Secondary</td>
<td>12.4 (221)</td>
<td>38.4 (139)</td>
<td>61.6 (223)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>25.7 (745)</td>
<td>40.8 (304)</td>
<td>59.2 (441)</td>
</tr>
<tr>
<td>Urban</td>
<td>74.3 (2,158)</td>
<td>38.1 (823)</td>
<td>61.9 (1,335)</td>
</tr>
<tr>
<td>Union status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Union</td>
<td>37.1 (1,087)</td>
<td>40.5 (440)</td>
<td>59.5 (647)</td>
</tr>
<tr>
<td>No Union</td>
<td>62.9 (1,841)</td>
<td>37.2 (685)</td>
<td>62.8 (1,156)</td>
</tr>
<tr>
<td>Retirement status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>76.1 (2,204)</td>
<td>34.4 (757)</td>
<td>65.7 (1,447)</td>
</tr>
<tr>
<td>Not retired</td>
<td>24.0 (694)</td>
<td>52.6 (365)</td>
<td>47.4 (329)</td>
</tr>
</tbody>
</table>

Economic Context

The economic cost of preventable conditions such as HTN, is a significant burden to developing economies, especially those facing economic challenges. International estimates indicate that for every 10% increase in CNCD prevalence the annual economic growth of a country decreases by 0.5% [23]. This is particularly concerning for small developing economies like Jamaica which saw GDP growth of only 0.7% in 2012, and which expends a significant portion (approximately 43%) of its annual budget on the servicing of public debt [24].

Specifically, HTN is a burden to the health sector as scarce resources, in an already under-funded health system are allocated to the treatment and management of this preventable condition instead of being invested into addressing existing concerns about equitable...
Table 2. Cost Drivers of the Economic Burden of Hypertension (as at 2012)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total Costs (US$)</th>
<th>Annual Per Capita Cost (US$)</th>
<th>Relative Burden (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalization</td>
<td>10,851,082.11</td>
<td>3.10</td>
<td>5</td>
</tr>
<tr>
<td>Consultation</td>
<td>8,693,501.97</td>
<td>50.56</td>
<td>4</td>
</tr>
<tr>
<td>Medication</td>
<td>37,038,595.58</td>
<td>215.39</td>
<td>18</td>
</tr>
<tr>
<td>Lab investigation</td>
<td>59,589,821.22</td>
<td>346.54</td>
<td>29</td>
</tr>
<tr>
<td>Indirect costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morbidity</td>
<td>71,445,903.89</td>
<td>415.49</td>
<td>35</td>
</tr>
<tr>
<td>Mortality</td>
<td>17,057,818.75</td>
<td>99.20</td>
<td>8</td>
</tr>
<tr>
<td>Total costs</td>
<td>204,676,723.55</td>
<td>1,190.28</td>
<td>100</td>
</tr>
</tbody>
</table>

access to quality health services. The chronic underfunding of the health sector, which many developing nations will identify with, has resulted in an accumulation of deficits in the delivery of quality, equitable health care to the general population. The reallocation of drug and acute care savings from preventable CNCDs such as HTN may help in alleviating some of the concerns currently found in the health sector and improve health system and health outcome indicators.

Economic Implications of Cost Drivers

The direct costs associated with HTN (i.e., in- and out-patient care, drugs and lab services) represent the majority of the condition’s economic burden. It is important to note that this burden is not borne entirely by the government but is also heavily borne by individuals themselves. The Jamaican population, in spite of the removal of user fees and the provision of drug subsidies by the government, still spend large amounts in OOP/private costs to access health care. Due to various barriers to access in the public sector, the World Bank estimates that in 2013 OOP health expenditure (i.e., proportion of private health expenditure) was substantial at 60.5%. The major direct cost driver of this pandemic is laboratory investigations such as electrocardiograms and lipid profiles. These are recommended by the MOH to be undertaken by persons with HTN on a routine, scheduled basis. Much of this cost is not covered by the public sector (as public laboratory services are mainly restricted to hospital care) but is rather borne by the individuals.

Medication costs represent the direct cost driver that is of next greatest economic significance. The heavy burden placed on drug coverage is not unexpected, as multiple countries have identified this factor as being of significant economic importance to both national economies and to individuals; this is especially true in older populations. In Jamaica, the burden of medication consumption falls heavily on the resource-strapped government. Through the services of the aforementioned NHF and JADEP programmes, much of the drugs most commonly used for treating HTN are available to the population at heavily government subsidized rates. These drug subsidy programmes are financed through taxation on cigarette and fuel consumption [14]. This represents resources which could otherwise be utilized to reduce the financing gaps present in the health sector.

Though drug subsidies have reduced the cost barrier to pharmaceuticals for many older
Jamaicans, the drug burden is still felt at an individual level, as less than half (44%) of the older population reported having either of the health subsidy cards. Many of the current older population are unable to meet card requirements leaving them ineligible for this service and as such the remaining 54% bear the full cost of expensive pharmaceuticals needed to treat their HTN. Anecdotal evidence points to the risky practice of drug rationing by older individuals as a means of compensating for the high cost of drugs in the private sector. This further adds to government burden as non-compliance is associated with acute disease flares and secondary sequel. For those who have actually been able to access the drug cards, distance to pharmacies and the limit of only getting a 28 day supply of medications at any one time, also increase barriers to accessing drugs (both logistical and financial) for the relatively less-mobile older population. Overall, the individual economic burden for drug procurement remains high even for those who are covered.

Hospitalization and Consultations contribute a relatively small amount (5% and 8%, respectively) to the economic burden of HTN. In absolute terms, however, the burden is significant, with the secondary care system being burdened with an estimated additional 390,000 in patient days and primary care having over half a million HTN associated out-patient consultations during the period. This type of utilization of services places an unnecessary burden on an already stressed health sector. Persons who are hospitalized spend on average US$22,000 per annum on accessing medical care (hospital and consultation costs) as compared to non-hospitalized persons with hypertension who spend on average US$4,500 per annum. This points to the need for consistent management of hypertensives to prevent the additional cost associated with hospitalizations.

While the direct costs represent a majority of the economic cost for HTN, indirect costs associated with premature mortality and the need for a caregiver significantly contribute to the burden. The indirect costs associated with morbidity i.e. the need for a caregiver, actually represents the largest single driver of the HTN pandemic (35%). This cost is borne entirely by older adults and their families as such services are not available through the public sector. The proportion of older persons with HTN needing such services incur a significant OOP cost. On average these persons spend almost US$3000 annually for caregiver services; this is significantly greater than the entire average per capita health cost of the general population (US$300) and that of older persons with HTN (US$700).

Many older adults continue to participate in income generating ventures even beyond retirement years (many in excess of 10 years post retirement) [25-28]. As HTN increases the likelihood of prolonged disability and premature mortality, it reduces productivity and economic viability of older populations at the individual and national levels. In addition to this, mortality cost is difficult to accurately quantify in economic terms, as the decreased contribution to the economy is only one aspect of premature mortality. Loss of social capital through reduced intergenerational interaction and between older
adults and their children and grandchildren pose a significant loss in terms of cultural preservation. Morbidity also prevents older adults from contributing to caregiving services provided by grandparents which allows for increased economic stability within families as both parents are able to engage in the labour market at a relatively lower cost.

Not only does the presence of NCDs such as HTN reduce economic growth, but they also result in allocative inefficiencies within the health sector, which is forced to spend scarce monies to address the sequelae of these potentially preventable conditions. Based on its tight fiscal space, Jamaica as do other developing small states facing similar situations, cannot afford to allocate resources in such an inefficient manner. Where feasible, cost drivers that can be reduced or eliminated must be identified through costs analysis methods such as those applied in this paper and targeted interventions undertaken to reduce/eliminate unnecessary expenditure.

The major implication of our findings is that neither the national economy nor individual patients themselves can manage the economic burden of HTN in older adults in Jamaica. As such, interventions must be made to reduce this burden on both the national economy and on the vulnerable older population. Having identified the major cost drivers for the HTN burden, targeted interventions are required to increase efficiencies in delivering care and most importantly in preventing the development of this condition and thereby, ameliorating the associated costs.

**Study Limitations**

The economic burden reported in the paper represents estimated spending based on health-seeking behaviours of older Jamaicans. It includes both government and individual costs as experienced in 2012. One of the major principles to note for these data, is that travel costs during health seeking activities were not included in the cost, as these data were not captured in the survey. Disease severity and associated complications, while critical in contemplating the impact of HTN in any population was beyond the scope of this analysis. It is the intent and recommendation of the authors that further analyses be undertaken to cost the burden of HTN-related complications.

**CONCLUSIONS**

The economic burden of HTN amongst the growing older population is high in absolute and relative terms (matching the value of almost a third of all conditions for the entire population). The average per capita cost for this condition is three times more than that for the entire population. Considering the increasing trend for both NCDs and for population ageing, this economic burden is concerning not only for developing states such as Jamaica, which must efficiently manage scarce resources, but also for the older adults who are scarcely prepared for the economic challenges of older age. Arguably, utilization of interventions focused on the life course approach to prevention and management of conditions such as HTN and its complications, would result in reduced disease burden and consequently less expenditure. This in turn would create the fiscal space to address other critical areas of health including health systems strengthening.

**AUTHORS’ CONTRIBUTIONS**

KMF was responsible for drafting the manuscript and along with AOA guided the scope of the paper and led data analysis. JMD conducted the literature review, assisted with identifying areas for analyses and with writing the discussion. DWT assisted with study design, as well as data analysis and interpretation. The study was conceptualized by DES who was the Principal Investigator. All authors have read and approved the final manuscript.

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CONFLICT OF INTEREST

Authors have declared that no competing interests exist.

DEDICATION

Regrettably, the lead author of this study, Dr Kathryn Mitchell-Fearon passed away soon after the submission of this paper. The rest of the authors dedicate this article to Dr Mitchell-Fearon’s memory. She was very passionate about health economics and expanding her expertise in the area.

We, at the JPHDC, are deeply saddened by this news and offer our sincere condolences to Dr Mitchell-Fearon’s family during this difficult time.

REFERENCES


