

# COMPARATIVE STUDY OF THE FREQUENCY OF HYPERTENSION IN A PRIMARY CARE SETTING IN BUZA, TANZANIA & MALTA

## ABSTRACT

**Introduction:** Worldwide prevalence of hypertension (HT) in established market economy countries is estimated at 37.4% for males and 37.2% for females.

**Aim:** To identify the frequency of HT in sample populations of Malta and Buza, Tanzania, looking specifically at gender differences, the rate of previous diagnosis and compliance to medication.

**Methods:** A comparative cross-sectional population-based survey to calculate the frequency of hypertension of a sample of the Maltese population reviewed in 2010 and a sample of people reviewed in a primary care medical clinic Buza in that same year. Both samples were statistically matched and compared.

**Results:** Frequency of HT in the Maltese sample was 32.8% (M:F - 32.8:32.8), and compliance rate was 48%. The frequency of HT in the Buza sample was 48.4% (M:F - 47.7:48.9) and the compliance rate was 8%. Frequency of stage II and malignant HT were significantly more prevalent in the Buza population. The frequency of HT increased with age in both populations studied.

**Conclusions:** Prevalence of examined HT in the Maltese sample was higher than the self-reported survey carried out in 2008, but still lower than the Buza sample and within range of the established market economy countries. Education and awareness of HT will increase lifestyle changes and further reduce the frequency of HT and increase the compliance rates in both populations. Hypertension awareness and readily available treatment is a much needed public health service. Furthermore, it is cheap, easy to offer and significantly improves quality of life.

## KEY WORDS

Hypertension, age standardized prevalence, Malta, Tanzania

## INTRODUCTION

Hypertension (HT) is defined by the World Health Organisation as a persistent raised arterial blood pressure (BP) of over 140/90 mm Hg. It is estimated that nearly one billion people have hypertension worldwide<sup>1</sup> and is one of the main risk factors for heart disease and stroke.<sup>2</sup> With an increasingly aging population, as well as rise of other risk factors such as obesity, HT is an ever-growing medical problem.

A recent systematic review on hypertension reports a worldwide prevalence of 37.4% in males and 37.2% in females in established market economy countries. The prevalence of HT varies greatly between countries, the lowest prevalence being in rural India (M:F-3.4:6.8%) and highest in Poland (M:F -68.9:72.5%).<sup>3</sup>

One multinational study carried out in the United States(US), Canada and six European countries (Germany, Finland, Sweden, England, Spain, Italy) reports the age- and sex-adjusted prevalence of HT to be 28% in the North American countries and significantly higher in the European countries (44%).<sup>4</sup>

A study reviewing compliance in the US reported 69% of the population to be aware of their HT diagnosis and the compliance rate to medication ranged from 53% to 79%.<sup>5</sup> The compliance rates in three Central European countries (Austria, Hungary, Slovakia) was found to be 53.5%.<sup>6</sup> A UK study reported a prevalence of 11.7% for the patient cohort 25-79 years and 46% for patients over 65 years.<sup>7</sup>

The Mediterranean country we intend to study is Malta. The population of Malta in 2009 was estimated to be 412,970 and is the eighth most densely populated country in the world (1,318 persons/km<sup>2</sup>).<sup>16</sup> As a result of this high population density, 92% of Malta is urban.<sup>17</sup> It has a GDP per capita of 19,248 billion US dollars.<sup>18</sup>

The EUROSTAT health interview survey conducted in 2008 shows the prevalence of hypertension in Malta to be 22.1%. It also reveals that 17.2% had been previously prescribed medication for their hypertension.<sup>19</sup>

We intend to compare the data from Malta to a suburb of Dar Es Salam, Tanzania, named Buza. Tanzania, an east African country, has a population of 38,329,000, and an estimated growth rate of 2%. The population distribution is uneven, varying from 1 person per sq. km to 134 per sq. km, to 1,787 per sq. km in Dar Es Salam. Over 80% of the population lives in rural areas.<sup>20</sup> GDP per capita stands at 1,416 US dollars.<sup>21</sup>

Hypertensive heart disease complications are shown to occur more frequently in Africans than in Europeans and North Americans and the majority of affected patients are younger.<sup>22</sup> This is a growing problem in all African communities<sup>23</sup>

A study carried out in Tanzania reported a prevalence rate of HT

Country study was carried out	Male Prevalence (%)	Female Prevalence (%)
India <sup>3</sup>	2.4	6.8
Girona, Spain <sup>8</sup>	14.1	16.9
South West of France <sup>9</sup>	21.0	19.0
Turkey <sup>10</sup>	31.8	31.6
Morocco <sup>11</sup>	30.2	37.0
Hellas, Greece <sup>12</sup>	33.8	28.4
Pavia, Italy <sup>13</sup>	40.0	19.0
Algeria <sup>14</sup>	32.7	44.0
San Marino <sup>15</sup>	44.0	47.0
Poland <sup>3</sup>	68.9	72.5

**Table 1:** Prevalence of Hypertension reported in different countries

in M:F - 30:26.8% in Ilala (urban area), and M:F - 32:31.5% in Shari (rural area). In both areas, less than 20% of hypertensive subjects were aware of their diagnosis and approximately 10% reported they had previously received treatment; less than 1% had controlled HT.<sup>24</sup> Another study carried out in an urban area in Tanzania reported a prevalence of 57% for type I HT and 30% for Type II HT.<sup>25</sup>

A similar trend in the prevalence of hypertension has been reported in other East African countries: Addis Ababa, Ethiopia M:F- 31.5:28.9<sup>26</sup>, Nakuru, Kenya 50.1%, comparable in men and women<sup>27</sup> and Mozambique; M:F - 35.7:31.2%.<sup>28</sup>

The aim of this study is to compare the prevalence of hypertension of Malta to Buza. We aim to compare the data whilst adjusting for age, gender and population size. To date we believe that this is the first comparative study to be done between these countries. The authors hypothesise that the prevalence of HT will be higher in Buza than in Malta due to an overall better quality of life in Malta (rank 28) compared to Tanzania (rank 109) on the Quality of Life Index scale<sup>29</sup>

## METHODS

### STUDY DESIGN

A comparative cross-sectional population-based survey to calculate the frequency of hypertension of a selected sample of the Maltese population compared to a sample of people reviewed in a primary care medical clinic Buza, Tanzania. Both samples were picked from an urban population setting, the latter population being of an overall lower socio-economic status.

### SAMPLE POPULATION

The data for the sample of the Maltese islands was part of a national pilot study. This was conducted in 2010 as part of the European Health Examination Survey Pilot project. The Finnish lead partners developed the survey protocol. The Maltese team followed this protocol during the examination. Examinations were held in a

public clinic in Gwardamangia, Malta and home visits were carried out where participants were unable to travel to clinic.

Using direct standardisation, the selected sample (n=400) was representative of the Maltese resident population aged 18 and over and selected randomly from an updated population register. Random stratification was conducted by gender, 10-year age group and region of residence.

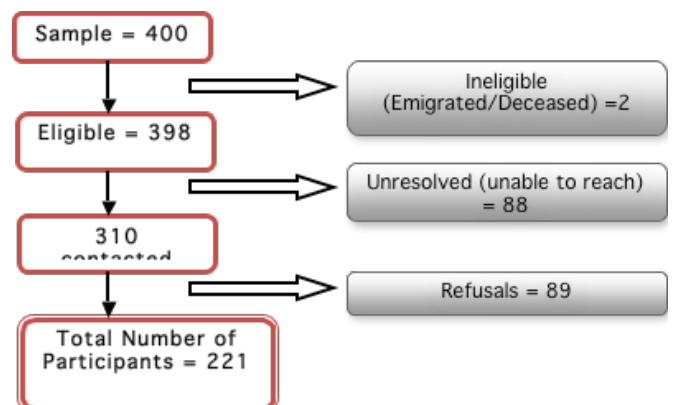
Of the 221 participants, 219 (99.1%) had their blood pressure measured (for 2 participants the meeting never went ahead). 111 (50.7%) of the population were males, whilst 108 (49.3%) were females. Demographic data can be seen in table 2. The mean age of the population was 46years (range 18-86).

The protocol required that the blood pressure is measured three times. The average from the last two blood pressure measurements was taken as the final result. Apart from the measured data, respondents were asked before the examination if they have ever suffered from hypertension and if they were taking any medication for hypertension.

The **Buza sample** included any patient ≥ 18 years (n=202) who attended the clinic for any medical reason between the 19<sup>th</sup> July and 6<sup>th</sup> August 2010. Satisfactory data (in a few cases BP readings were not documented or taken by the clinician for one reason or other) was available on 198 patients (98.0%), 160 (85.0%) of whom were females and 38 (15%) were males. Demographic data can be seen in table 3. The mean age for the population studied was 37.8years. The ages ranged from 18 to 88 years.

In the **Buza sample**, every person attending the clinic had their blood pressure assessed by one of the clinicians. This was recorded in the patient's case notes (and repeated twice or more, so as to ensure accuracy), and then managed by the doctors working in the clinic.

Every patient attending the clinic had a full history taken by a doctor. Apart from the measured data, respondents were asked before the examination if they have ever suffered from hypertension and if they were taking any medication for hypertension.



**Figure 1:** Sample of Maltese population

	Male % (N)	Female % (N)	Total % (N)
<b>Total</b>	<b>50.7 (111)</b>	<b>49.3 (108)</b>	<b>100 (219)</b>
<b>Age</b>			
<25	9 (10)	8.3 (9)	8.7 (19)
25 – 34	19.8 (22)	16.7 (18)	18.3 (40)
35 – 44	15.3 (17)	13.9 (15)	14.6 (32)
45 – 54	15.3 (17)	18.5 (20)	16.9 (37)
55 – 64	22.5 (25)	24.1 (26)	23.3 (51)
65 – 74	13.5 (15)	12 (13)	12.8 (28)
75+	4.5 (5)	6.5 (7)	5.5 (12)

**Table 2:** Overview of age frequency of the Maltese sample

	Male % (N)	Female % (N)	Total % (N)
<b>Total</b>	<b>19.2 (38)</b>	<b>80.8 (160)</b>	<b>100 (198)</b>
<b>Age</b>			
<25	13.2 (5)	8.8 (14)	9.6 (19)
25 – 34	18.4 (7)	28.1 (45)	26.3 (52)
35 – 44	5.3 (2)	22.5 (36)	19.2 (38)
45 – 54	13.2 (5)	18.1 (29)	17.2 (34)
55 – 64	21.1 (8)	10 (16)	12.1 (24)
65 – 74	23.7 (9)	8.1 (13)	11.1 (22)
75+	5.3 (2)	4.4 (7)	4.5 (9)

**Table 3:** Overview of age frequency of the Buza sample

## INCLUSION CRITERIA

The sample from both populations included any adult  $\geq 18$  years of any gender and social class. Only participants who could give informed consent were included in this study.

## EXCLUSION CRITERIA

All patients under the age of 18 years were excluded from our study.

## ETHICAL CONSIDERATIONS

Participation in both surveys was against informed consent. All participants were asked to consent to the anthropometric measures separately from other components of the examination such that they could chose to opt out of specific measures without being excluded from the examination. Only participants who were deemed to have capacity to consent to the study at that present time were included. The final dataset was anonymized and kept confidential using password protected datasets.

## DATA ANALYSIS

All data collected was inputted into Microsoft Excel and analysed using SPSS version 19. The Buza and Maltese sample were split by age and gender and Fisher's Exact test was used to see how comparable the study populations were. While there were no significant differences between the male populations (Malta  $n=111$ , Buza  $n=38$ ,  $P=0.58$ ) there was a significant difference between the female populations (Malta  $n=108$ , Buza  $n=160$ ,  $p<0.001$ ). Also the Buza population had a gender imbalance within their sample i.e. an overly high proportion of females; whilst the Maltese sample had a higher proportion of persons aged 55-64 years when compared to the national population. These sample differences made it difficult to compare populations, so direct standardisation was used to calculate age-standardised prevalence against the resident Maltese population in 2009. Confidence intervals were then calculated.

## RESULTS

### PREVALENCE

The age standardised rate of HT in the Maltese population was 32.8%, 95% confidence intervals 95%  $\pm 5.1\%$  (95% CI). This was statistically significantly lower than the age standardised rates of HT for the population in Buza i.e. 48.4% (95%CI  $\pm 6.5\%$ ).

The standardised rates for males in Malta (32.9%, 95%CI  $\pm 7.8\%$ ) were lower than the Buza male sample (47.7%, 95%CI  $\pm 16.8\%$ ). A similar trend was seen in the female sample; the frequency in Malta was 32.9% (95%CI  $\pm 6.3\%$ ) compared to the Buza sample 48.9% (95% CI  $\pm 7.6\%$ ).

### STAGES OF HYPERTENSION

A blood pressure within normal range was found in 73 cases (33.3%) of the Maltese population, which was slightly lower than the population studied in Buza ( $n=69$ , 34.3%). There was a higher proportion of the Maltese population who presented in a pre-hypertensive stage ( $n=72$ , 32.9%) compared to Buza ( $n=43$ , 21.7%). Stage 1 hypertension was commoner in the Malta sample ( $n=54$ , 24.7%) when compared to the Buza sample ( $n=25$ , 12.6%). However, there was a markedly higher frequency of stage 2 hypertension recorded in the Buza sample ( $n=31$ , 15.7%).

### INCIDENCE AND CONTROLLED CASES

62 cases in the Buza sample (69.7%, CI 95% 60.1 – 74.2%) were incident cases. The frequency of new cases was higher than the Maltese sample ( $n=38$ , 51.1%).

48 cases were prescribed medication in the Maltese sample; 23 (47.9%) of these patients had their hypertension controlled (i.e. blood pressure  $< 140/90$ mmHg). The rate of controlled hypertension was significantly higher ( $P<0.001$ ) than the number of cases in the Buza sample ( $n=2$ ), out of 25 patients meant to be on medication.

## DISCUSSION

The prevalence of HT in the Maltese sample was lower (32.8%) than the sample studied in Buza (48.5%). However the frequency was higher than the self-reported survey (22.5%) carried by the department of health in 2008. This result of examined blood pressure is more reliable than the self-reported results carried out in 2008. The above result is in keeping with the authors' hypothesis and can probably be explained by the substantial difference in the quality of life between the two countries (Malta 28<sup>th</sup> and Tanzania 109<sup>th</sup>).

The prevalence in Malta was lower than the average calculated for the market economy countries (37.3%) and North Africa Mediterranean countries (Algeria and Morocco), similar to the prevalence reported in Greece and Turkey but higher than the western European countries (Spain and South West France).<sup>3</sup> The prevalence in Buza was found to be within the range reported in studies (30-57%) carried out previously in Tanzania.<sup>24,25</sup> The prevalence in Buza was higher than that reported in Ethiopia (31%)<sup>26</sup> and Mozambique (33.5%)<sup>28</sup>, but lower than that found in Nakuru, Kenya (50.1%).<sup>27</sup>

No statistically significant difference was found between males and females in both population samples. The prevalence of patients suffering from Stage 2 Hypertension in Buza (12.6%) was more than double that of Malta (5.9%). However the Maltese sample had a higher prevalence

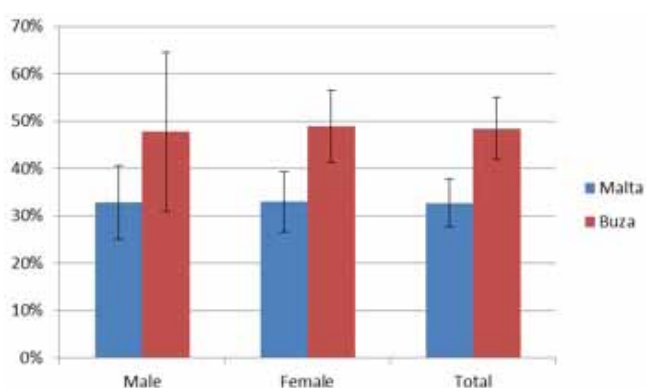


Figure 2: Frequency of hypertension by gender

	Malta N (% , 95%CI)	Buza N (% , 95%CI)
<b>Total</b>	<b>219 (100)</b>	<b>198 (100)</b>
Blood pressure within normal range	73 (33.3, 39.5 – 27.1)	68 (34.3, 43.7 – 25.1)
Pre-hypertensive: 120-139/80-89	72 (32.6, 38.8 – 26.4)	43 (21.7, 29.3 – 13.6)
Stage 1 hypertension: 140-159 or >90-99	54 (24.4, 30.1 – 18.7)	31 (15.7, 22.8 – 8.6)
Stage 2 hypertension: >160/100	13 (5.9, 9.0 – 2.8)	25 (12.6, 19.1 – 6.1)
Malignant hypertension: >180/110	0 (0)	19 (9.6, 15.4 – 3.8)
Hypertension >130/80 with DM, CHD,MI, CVA, kidney disease	6 (2.7, 4.8 – 0.6)	6 (3, 6.3 – 0.6)
Isolated hypertension: >140 and <90	1 (0.5, 1.4 – 0.4)	6 (3, 6.3 – 0.6)

Table 4: Number of cases in the different stages of hypertension

	Malta N (%)	Buza N (%)
<b>Total Cases</b>	<b>74 (100)</b>	<b>88 (100)</b>
Incidence	38 (51.4)	62 (69.7)
Prevalence	36 (48.6)	27 (30.3)
Prescribed medication	48 (64.8)	25 (28.4)
No prescribed medication	26 (35.1)	63 (71.6)

Table 5: Comparisons between Malta and Tanzania for incidence and medication

of patients with Stage 1 Hypertension and Pre-Hypertensive blood pressure. Malta also had a higher prevalence rate but a lower incidence rate than Buza, highlighting the greater awareness and availability of clinics to manage HT in Malta and other developed nations.

It was also found that in both hypertensive cohorts, the Maltese patients had better HT control. This reflects a better compliance rate amongst the Maltese population (48% compared to 8% in Buza) which may be related to a greater HT awareness amongst the population and healthcare professionals in Malta. This could also be a result of more widely available health services. Less than a third of the sample in Buza were aware that they were suffering from high blood pressure; this is comparable to a parallel study (20%) carried out in Ilalia Tanzania.<sup>24</sup> Over 9% of the target population in Buza had malignant hypertension, but no cases of malignant hypertension were reported in Malta, further substantiating better HT awareness and the availability of services.

It was further observed that in the 35-44 and 45-54 year age groups the prevalence of hypertension in women in Buza rose from 33% to 66%. One can hypothesise that most probably almost all women in menopause were suffering from hypertension. This is further substantiated by the increase in frequency of hypertension with age. In males this increase in HT was not statistically significant ( $P = 0.149$ ) though this could be a result of the small male sample. This finding differs from other studies as the rate of HT in males increases proportionally with age.<sup>30</sup> The trend of proportionally increasing

HT in both sexes by age was found in the Maltese sample. The greater frequency of HT in Malta may be a result of Malta's ageing population, with 13% of the population above the age of 65.

### STRENGTHS AND LIMITATIONS OF THE STUDY

The results from our study report only examined BP as opposed to self-reporting, thus reducing a recall bias.

The population sample in this study did not only include patients who were ill but also those who attended the clinic merely for a check up, thus reducing the selection bias.


All patients had their BP checked at least twice in keeping with recommended standards.

Limitations of this study include a relatively small sample size, although direct standardisation was used to account for any discrepancies in representation of the target population. A longitudinal study with a larger sample size is recommended.

### CLINICAL IMPLICATIONS

In keeping with the human development index, the prevalence of HT in the Maltese sample was lower than that found in the Buza sample. Further education and awareness campaigns directed to all ages of the population on HT prevention strategies would reduce prevalence rates in the Maltese population and also improve the HT medication compliance rates.

The prevalence of hypertension is expected to rise substantially in sub-Saharan Africa, so the authors call for population-based studies and registries of the epidemiology of hypertension in the African population. The provision of awareness campaigns and more clinics available for assessment and management of HT in the health services in Tanzania is strongly recommended. As reported in this study this cheap provision of service yields quick positive results, thus improving the overall quality of life of the people living in Tanzania.

As other HT studies reported in other countries, more than half of respondents took action following the receipt of advice.<sup>5</sup> The authors believe that this simple measure will have a highly positive effect on the people living in these countries. 

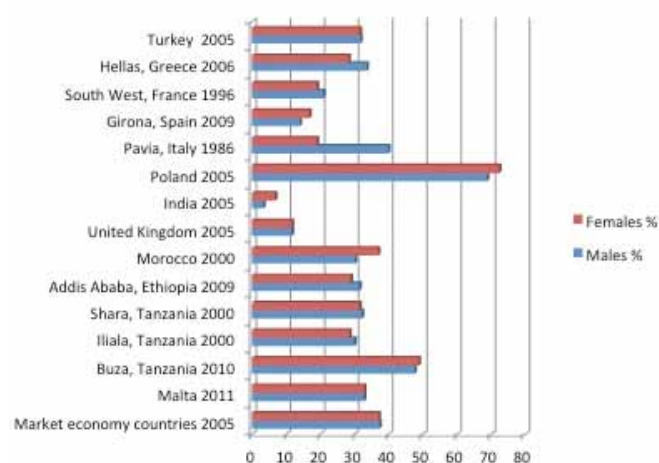


Figure 3: Male and female prevalence of hypertension

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