

## **Ill Health and Labour Market Participation in Tanzania: Empirical Evidence from Tanzania National Panel Surveys**

*Abdilah Issa,\* Razack Lokina<sup>§</sup> & Cornel Joseph<sup>‡</sup>*

### **Abstract**

*This paper examines the effect of ill health status on labour participation in Tanzania using panel methods with data extracted from three waves of the National Panel Survey datasets of 2010/11, 2012/13, and the extended panel of 2019/20. Based on estimated random effect probit models, the results show that chronic ill health status has a significant negative effect on labour market participation in Tanzania. By locality, both chronic and acute ill health are significant and negative on labour participation in rural areas; whereas by sex chronic ill health is significant and negative on male's participation. Therefore, the study recommends the adoption of more effective policies and interventions to reduce the prevalence of chronic and acute illness so as to bring more Tanzanians into the labour force. Also, it recommends mainstream employment policy actions to support those with partial work capacity from incurable ill health conditions to take up jobs.*

**Keywords:** Ill health, chronic illness, acute illness, labour force, labour market participation

### **1. Introduction**

Healthier workers have greater physical and mental abilities sufficient to work hard and longer compared to ill workers (Antczak & Miszczyńska, 2021; Bloom & Canning, 2005; Ford et al., 2011). Also they can easily learn and adopt the effective means of production that can increase their work efficiency (Adhvaryu & Nyshadham, 2011; Ghatak, 2010; Lushaju, 2019; WHO, 2002). So, health is a form of human capital with an immense contribution to the economy through improving labour market outcomes such as labour participation, productivity and earnings as better health improves workers' strength, endurance and mental capacities. On the other side, ill health erodes away human capital, which can affect labour participation rate through increased work absenteeism and inability (Antczak & Miszczyńska, 2021; Corbière et al., 2020; Machio, 2014). This may leads to further reduction of potential labour supply and labour market participation rate.

Indeed, evidence shows the prevalence of many ill-health problems, especially in developing countries that causes deaths, injuries, reduced life expectancy and disability to many people, which consequently affect national labour force and the rate of labour market participation (WHO & UNDP, 2016; WHO, 2017a; MoCDGWSG, 2021; Antczak & Miszczyńska, 2021). Despite these hazards of ill health, there is limited empirical evidence on the link between ill health and labour market

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\* Institute of Development Studies, University of Dar es Salaam, Tanzania: [abdilah.issa@udsm.ac.tz](mailto:abdilah.issa@udsm.ac.tz)  
(Corresponding author)

<sup>§</sup> Department of Economics, University of Dodoma, Tanzania

<sup>‡</sup> Department of Geography and Economics, Mkwawa University College of Education, Tanzania

participation in developing countries. The existing studies support the negative influence that ill health has on labour market participation (Bridges & Lawson, 2008; Machio, 2014; Novignon et al; 2015; Dogrul, 2015; Nwosu and Woolard, 2015; Ahuru & Akpojubar, 2020). However, the effect of ill health on labour force participation varies by gender and locality. The few studies that have examined gender differences in the effect of illness on labour force participation have reported conflicting findings (Bridges & Lawson, 2008; Zhang et al., 2009; Machio, 2014). For example, Zhang et al. (2009) found that men were more likely than women not to participate in the labour force due to chronic illness, especially mental illness. Contrarily, Bridges and Lawson (2008), Antczak and Miszczyńska (2021) and Machio (2014) found that the effect of ill health on labour market participation is stronger for women than men. Harris, (2008) reported mixed findings as well: that the effect of cardiovascular diseases on labour force participation was higher for men than women, while the effect of diabetes on labour force participation was higher for women than men. With respect to locality, Mduma and Wobst (2005) found no significant effect of ill health status on wage labour, but a negative significant effect of ill health on causal labour in rural Tanzania.

Furthermore, existing studies—particularly in Tanzania by Lushaju (2019) and Mduma and Wobst (2005)—have narrow coverage. Lushaju (2019) did not cover acute ill health; while Mduma and Wobst (2005) limited their study on rural labour markets only. Also, both studies utilised cross-sectional data and estimation methods. Thus, with this research gap, more empirical studies are required to provide more and robust evidence on the effect of health status on labour market participation. In this study, we examine the effect of both chronic and acute ill health on labour market participation in Tanzania using panel methods, with data extracted from three waves of the National Panel Surveys of 2010/11, 2012/13, and the extended panel of 2019/20.

The rest of this paper is organized as follows. Section 2 provides the general overview of ill health and labour market participation in Tanzania. Section three presents the research methodology, while section four describes the data. Section five presents and discusses the empirical results; and finally, section six provides conclusion and policy implications of the study.

## **2. Overview of Ill Health and Labour Market Participation Rate in Tanzania**

### ***2.1 Status of Ill Health in Tanzania***

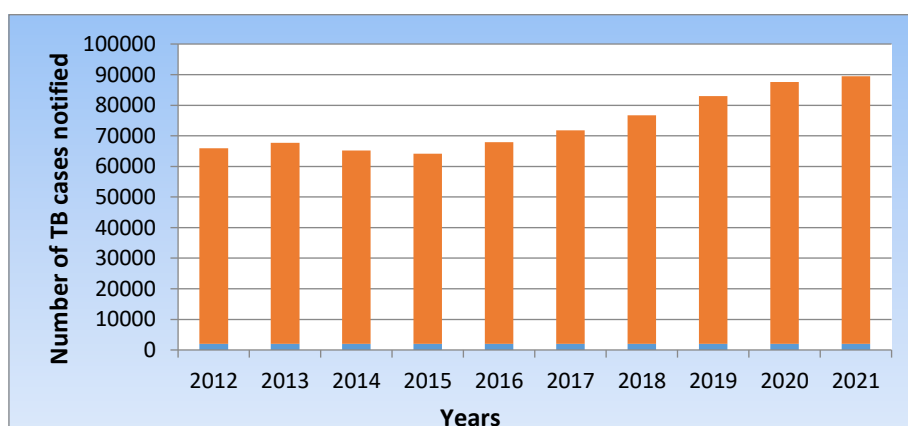
Both chronic and acute ill health have been among the core problems to development in Tanzania since independence. The Arusha Declaration (1967) advocated three compounding enemies of development; one among them being diseases, the component of ill health (Che-Mponda, 1986). Since then, the government of Tanzania has been making efforts to achieve better health to its people as one of the ways to alleviate poverty. This has been implemented through the provision of education on disease prevention, sanitation and nutrition (MoCDGWSG, 2021; MoHCDGEC, 2017). Also, it has been achieved through improving road safety, prevention of drug abuse and trafficking, as well as ensuring that enough resources are directed and effectively utilised towards the provision of better health services (MoCDGWSG, 2021; MoHCDGEC, 2017).

Despite these efforts, Tanzania is still facing a high burden in the health sector due to the presence of many diseases, high mortality, malnutrition, harmful use of alcohol, drug abuse and road traffic accidents (MoHCDGEC, 2016; Rose Kalage et al., 2012; MoCDGWSG, 2021). For example, 3.8 percent (897 individuals) and 5.4 percent (879 individuals) of the total population studied in the Tanzania National Panel Surveys of 2014/15 and 2020/21 had suffered from both acute and chronic illness (NBS, 2022). This results to ill health and deaths among Tanzanians, consequently causing detrimental effects to the economy, and specifically on labour market participation.

**2.1.1 Communicable Diseases**

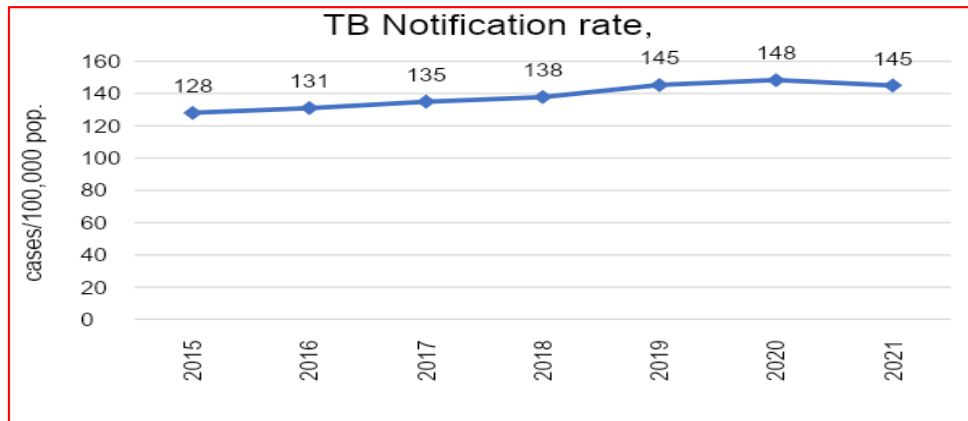
The incidences of communicable diseases are high enough to affect labour market outcomes such as labour participation in Tanzania. However, they are decreasing as a results of increased prevention, sensitization and treatments (MoCDGWSG, 2021; MoHCDGEC, 2017; WHO, 2020). Malaria is one of the communicable diseases the country is suffering from, and which causes acute ill health; and it is the leading cause of morbidity and mortality to pregnant women and under-five aged children in Tanzania (MoHCDGEC, 2017; NBS, 2023). Moreover, HIV/AIDS is a chronic communicable disease affecting different sectors of the economy in Tanzania through the deaths of many people of the national labour force. For example, a total of 27,000 and 24,000 deaths from HIV/AIDS were recorded in 2016 and 2018, respectively (MoCDGWSG, 2021; WHO, 2020).

TB cases are still high in Tanzania, causing chronic ill health. For instance, 492/100,000 and 306/100,000 people suffered from TB in 2007 and 2015, respectively. The total estimate of TB cases in Tanzania was 164, 000 in 2015 and 142,000 in 2019 (MoHCDGEC, 2017; WHO, 2020). The total new annual TB infection and TB cases per 100,000 population have been increasing from 63,892 cases in 2012 to 87,415 in 2021; and 128 cases per 100,000 population in 2015 to 145 cases in 2021, respectively (MoCDGWSG, 2021; NTPL (URT), 2022). The trend of TB cases notification rate is demonstrated in Figures 1 and 2.



**Figure 1: Annual Trend of New TB Infection in Tanzania: 2012–2018**

Source: (WHO 2020; (NTLP, 2022; NTPL(URT), 2022)



**Figure 2: Annual TB Notification Rate per 100,000 Population in Tanzania**

Source: (NTLP, 2022)

### 2.1.2 Non-communicable Diseases

Non-communicable diseases (NCDs) are the leading causes of global deaths and the growing threat in developing countries (WHO, 2017b). They are mentioned as the overwhelming public health problem in developing countries because they accounted for 56.4m global deaths in 2015, of which 75% were from low- and middle-income countries; while in 2016 they accounted for 71% of the total deaths (WHO, 2017b; World Health Statistics, 2020). In Tanzania, NCDs contribute about a third of all deaths, and are a source of disabilities. For example, in 2017 they accounted for 34% of the total deaths in the country (MoCDGWSG, 2021; WHO, 2017b).

The commonly occurring non-communicable chronic diseases in Tanzania include cancer, diabetes, cardiovascular disease (hypertension), injuries, mental illness and anaemia or sickle cell disease (MoCDGWSG, 2021). The overall estimate of mental illness is at least 1% of the total population in Tanzania at any time, of which the increased survival of people with mental illness increases the number of economically inactive people (Corbière et al., 2020; MoHCDGEC, 2017). The world mental health report of 2022 pointed out that mental disorders affect 1 in every 8 people around the world (WHO, 2022b). Additionally, the 2020 World Health Organization country report on mental health indicates that in the United Republic of Tanzania, age-standardized suicide mortality rate per 100,000 population in 2019 was 8.15 (WHO, 2022a). This implies that about 8 deaths occurred in every 100,000 people due to suicide caused by mental health problems such as depression, anxiety, anger and drug abuse: all this resulting into the loss of national labour force, reduced productivity, reduced labour market participation and earnings in the country.

Likewise, new cancer incidences are increasing in Tanzania; reaching 40,464 cases per annum in 2020, involving both sexes and all ages (WHO, 2021). Cervical cancer is the predominant type of cancer that kill more than 4,000 women each year in Tanzania. It caused 6,525 deaths in 2020, when 10,241 new cervical cancer cases

were recorded. This is equivalent to 25.3 percent of all types of cancer incidences occurring in Tanzania, and 40.7 percent of all cancer incidences occurring to women (WHO, 2021). The situation is attributed to multiple factors like increased population, unhealthy practices such as excessive alcohol intake, higher age and tobacco smoking (MoCDGWSG, 2021). As a case in point, tobacco smoking is a major risk for developing cancer diseases. For example, the 2018 Global Adults Tobacco Survey reported that 12.9% and 1.1% of men and women, respectively in Tanzania, are smoking tobacco (NBS, 2018). This has increased the risk of developing non-communicable diseases like cancer, diabetes, chronic respiratory diseases, and cardiovascular diseases (NBS, 2018).

Another predominant non-communicable disease is anaemia, or sickle cell disease, which is an inherited chronic condition. This disease largely affects individual productivity and labour participation (Berghs et al., 2019). Global anaemia statistics show that about 300,000 children are born with anaemia each year, while in Tanzania the last published TDHS-MIS (2015/16) with data on anaemia shows that about 11,000 children are born with anaemia each year, making the country to be the 4<sup>th</sup> in the global ranking (MoHCDGEC, 2017). Furthermore, there are high incidences of diabetes and cardiovascular diseases in urban areas of Tanzania. For example, in 2012 the country recorded 9% and 26% of people with diabetes and hypertension in urban areas, respectively. This has been attributed to unhealthy life style such as eating style, refraining from physical exercises, excessive alcohol intake and tobacco smoking (MoCDGWSG, 2021). Thus, the presence of many non-communicable diseases may negatively affect the rate of labour market participation because they cause inability associated with high job absenteeism and deaths, which further reduce potential labour supply.

### *2.1.3 Drug Abuse and Harmful use of Alcohol*

Drug abuse and excessive use of alcohol has been a global problem with negative health effects such as premature death, injury and disability; which in many cases cause the loss of national labour force and retarded productivity. For example, the 2020 and 2021 world global drug reports notified that 269m and 274m people aged between 15 and 64 years used drugs in 2018 and 2019, respectively. This is an increase from 226m people in 2010, of which more than 60m are from Africa (UNODC, 2020, 2021). It has been estimated that the number of people with drug use disorders in the world reached 36m by 2019, and the number of drug users is projected to increase further to 299m people by 2030 (UNODC, 2021).

In Tanzania as well, there are many drug abuse and trafficking cases causing both chronic and acute ill health in the country, despite government efforts and the presence of strict laws and regulations enforced by the Drug Control and Enforcement Authority (DCEA) (DCEA, 2020, 2021). For example, the 2020 drug situation report of Tanzania indicated that marijuana is highly used, followed by heroin: between 250,000 and 500,000 people were estimated to be using heroin by 2014. Also, a total of 169,269 drug addicts were registered in different hospitals in Tanzania for treatment; of which 81.1% were males and 18.9% were females (DCEA, 2020, 2021).

Young adults are highly involved in drug abuse and drug trafficking; thus, they are highly exposed to diseases like mental illness, retarded health, HIV/AIDS and injuries. Again, this situation contribute to the loss of workforce; and reduced labour market participation, and hence family earnings (Mnunguli & Kisangiri, 2018).

Excessive and hazardous use of alcohol is another health problem in the country, where the majority starts drinking at early adult ages. This habit is associated with diseases such as diabetes, hypertension, injuries and HIV/AIDS through engagement in risky sexual behaviours (DCEA, 2021; MoHCDGEC, 2017). Excessive alcohol consumption can affect work capacity, labour participation and incomes as a result of retarded health and loss of jobs, especially due to drinking habits in daytime, or during work hours.

#### 2.1.4 Accidents and Injuries

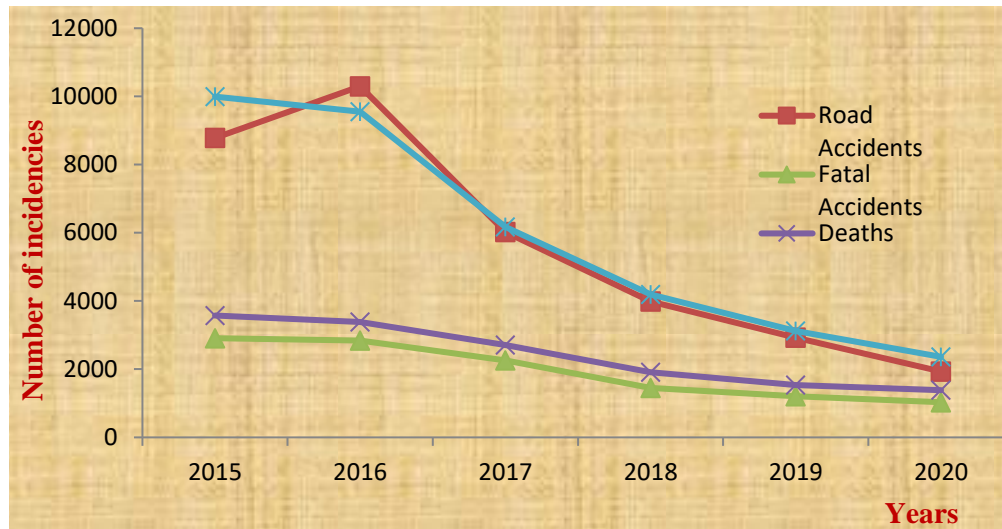
Accidents and injuries occurring in daily life contribute greatly to the disease burden in Tanzania, and in other developing countries (Walugembe et al., 2020). These include intentional incidents like committing suicide or taking poison; and unintentional injuries like those that occur due to motor traffic accidents, occupational and domestic causes, criminals, and violations that cause injuries or total death. Further, road traffic accidents are serious global health problems, and among the leading causes of deaths, injuries and disabilities with long-lasting effects on people. The global report on road safety reported 1.35m deaths from road accidents in 2016 (WHO, 2018).

Similarly, Tanzania has been experiencing many road accidents that have been causing deaths, injuries and disability to many people (see Table 1). These include traffic collisions and vehicle crashes that involve buses, three-wheeled vehicles, and more worse, motorcycles '*bodaboda*' (Tanzania Police Force & NBS, 2017, 2018). Road accidents are the leading cause of deaths and permanent disabilities in Tanzania to the group of people aged 10 to 50 years. A study on Mortuary Fatal Injuries Surveillance from 2010 to 2015—in both in rural and urban areas of Tanzania—found that 1,222 out of 2,387 deaths were due to road accidents; while suffocation was found to be the main means of intentional injuries (MoHCDGEC, 2017). Also, the Tanzania crime and traffic incidences report of 2020 reported 2,362 injuries and 1,384 deaths as occurring in roads accidents that happened from January to Dember 2020 (Tanzania Police Force, & NBS., 2021). With these statistics, it is obvious that accidents and injuries contribute largely to ill health conditions in the country, and may be largely affecting labour force and labour market participation.

**Table 1: Number of Accidents and Injuries in Tanzania: 2015–2020**

<b>Incidences</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Road accidents	8,777	10,297	6,022	3,988	2,924	1933
Fatal accidents	2,909	2,840	2,254	1,449	1,208	1031
Deaths	3,574	3,381	2,705	1,912	1,536	1384
Injuries	9,993	9,549	6,169	4,194	3,123	2362

Sources: NBS (2020; 2021)



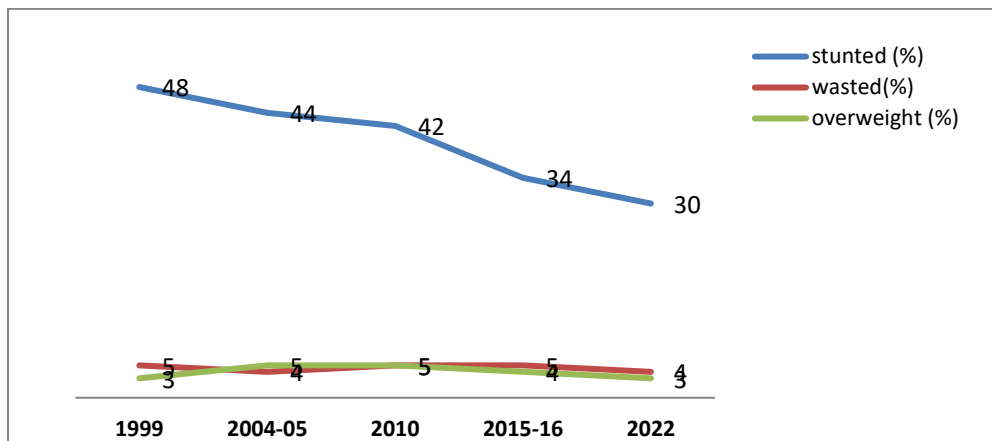
**Figure 3: The Trend of Accidents and Injuries in Tanzania: 2015–2020**  
Sources: NBS (2020; 2021)

The rapid decline of road accidents and injuries from 2016 onwards (Figure 3) has been attributed to efforts taken by the traffic police force in enforcing traffic laws and regulations such as the control of over-speeding using the Vehicle Trucking System (VTS) for buses and long vehicles, and speed radar (torch) in highways; imposing penalties to those who violates traffic laws and regulations; control of drivers intoxication; provision of education on road safety gears to different groups of road users; the increase of voluntary compliance with road traffic laws and regulations; strengthening of patrols and inspection in highways; and other similar measures (Hamisi & Juma, 2019; Tanzania Police Force & NBS, 2017, 2018). However, the rate is still high enough to affect labour market participation in the country.

### 2.1.5 Malnutrition

Malnutrition leads to the development of more chronic ill health conditions like mental and physical impairment, diabetes and hypertension (Howitt, 2005). In Tanzania, malnutrition is high to children and adults in terms of poor growth and obesity. The demographic and health surveys of 2015/2016 found that one-third of children under-five years of age (34%) in Tanzania are stunted, while 14% are underweight (see the trend in Figure 4) (Khamis et al., 2020; MoHCDGEC, 2017; URT, 2019; WHO, 2020). Also the TDHS report for 2022 indicates that 30 percent of children aged under five years are stunted; 9 percent are severely stunted; 12 percent are underweight; and 4 percent are overweight (NBS, 2023). This implies that many children have nutritional deficiencies and get exposed to diseases like mental and physical impairments, as well as early deaths. This contributes to the loss of national labour force because poor childhood and maternal health induces reduced learning and skills acquisition capacity due to retarded physical and cognitive development (Howitt, 2005; WHO, 2017a; URT, 2019).

On the other side, malnutrition in the form of obesity is growing, especially to adults with higher education, who are residing in urban areas (MoHCDGEC, 2017; URT, 2019). Obesity increases the risks of developing diseases like diabetes and hypertension, which are likely to reduce productivity index and labour participation (URT, 2019). The number of obese women in Tanzania has been increasing from 22% in 2010 to 28% in 2016; with 48% of women aged 40–49 being obese. The Tanzania national nutrition survey of 2018 reported that 31.7 percent of women aged 15–49 years were overweight, and 11.5 percent were obese; whereas the prevalence of overweight in Zanzibar exceeded 40 percent (URT, 2019). So, despite the observed improvement in nutrition standards among Tanzanians, malnutrition and obesity are alive and kicking in the country.



**Figure 4: Malnutrition Trend in Tanzania for Under-five Years of Age**  
Source: TDHS (2022)

Figure 4 further indicates that the prevailing number of malnutrition is still high, although it has been declining since 1999. The declining trend is a result of promoting appropriate infants, maternal and child feedings; intensification of awareness and public sensitization on nutrition; as well as strengthening nutritional guidelines and regulations (URT, 2019; WHO, 2020). The prevailing nutritional deficiency and over-feeding in the country is due to inadequate implementation of nutritional guidelines and low awareness about nutrition to some community members, especially in rural areas (MoCDGWSG, 2021; MoHCDGEC, 2017; NBS, 2023). Thus, more education and sensitization is required to reduce or get rid of these problems.

## 2.2 Status of Labour Market Participation in Tanzania

Labour force participation rate entails the number of persons in the labour force, employed or unemployed, that are actively seeking jobs; expressed as the percentage of total working age population in a country (ILO, 2015; NBS, 2015). It shows the size of potential labour supply for production of goods and services important for economic growth and development. The variation in the rate of labour participation among different groups of people and countries is generally



influenced by disparate demographic and socioeconomic factors like the size of economically active population, health status, employment and work policy, household size, marital status, education level, age, gender, income status and other related factors (Burk & Montes, 2018; Fadayomi & Olurinola, 2014; ILO, 2015). Table 2 presents the overall labour force participation rate in Tanzania by locality and sex for the 2014/15 and 2020/21 periods.

**Table 2: Overall Labour Force Participation Rate in Tanzania (by Location and Sex).**

Location	Mainland						Zanzibar					
	2014/15			2020/21			2014/15			2020/21		
	<i>M</i>	<i>F</i>	<i>T</i>	<i>M</i>	<i>F</i>	<i>T</i>	<i>M</i>	<i>F</i>	<i>T</i>	<i>M</i>	<i>F</i>	<i>T</i>
DSM	81.3	71.5	76.2	78.8	74.3	76.4						
Other urban/ Urban	86.8	82.3	84.4	83.2	78.2	80.4	78.9	70	74.3	79.6	70.3	74.8
Rural	92.1	87.7	89.8	88.2	82.2	85.1	87.2	80.3	83.7	83.5	71	77.1
<b>Total</b>	<b>89.4</b>	<b>84.2</b>	<b>86.7</b>	<b>86.3</b>	<b>80.6</b>	<b>83.3</b>	<b>83.4</b>	<b>75.5</b>	<b>79.4</b>	<b>81.6</b>	<b>70.7</b>	<b>76</b>

Sources: (NBS, 2015; NBS & OCGS, 2021)

Table 2 indicates clearly that the rate of labour participation in Tanzania vary with sex and location. Males have higher participation rates compared to females. This may be due to the socio-cultural contexts in Tanzania where, in many families only men/males go for jobs while women stay at home performing domestic activities. Also, women drop out of work more frequently to fulfil domestic responsibilities (Ellis et al., 2007; ILO, 2020; Kabeer, 2012).

Rural areas have the highest rate of labour participation compared to urban areas. This situation can be attributed by the fact that the majorities in rural areas have primary education, and are obliged to get involved in any available job regardless of its condition. For example, 81.7% of the total graduates in Tanzania Mainland have primary education; and 70.9% live in rural areas (NBS, 2021; NBS & OCGS, 2014). Moreover, poverty and the absence of pension and other social security programs in rural areas may constrain old people from retirement, and push even children and students who are generally inactive people to be involved in agriculture and other informal activities (ILO, 2020).

Apart from sex and location, the rate of labour participation in Tanzania also varies with education level. The highest rate of labour participation occurs to those who have completed primary education and live in rural areas, followed by those who have never attended school at all (NBS, 2015, 2021; OCGS, 2016, 2021). This is possibly due to the fact that people with primary education, and those who have never attended school, in many cases lack requirements for formal employments. This makes them opt for any available job in their local labour market that requires more of physical abilities (ILO, 2020). The informality in the local labour market makes them easily get jobs and enable them highly participate in the labour market, compared to those with higher education who in most cases are job-selective.

### 3. Methodology and Empirical Strategy

#### 3.1 Theoretical Framework

The theoretical framework for labour market participation is grounded on the arguments of human capital theory towards the relationship between health, as a human capital, and labour market outcomes. As used by Pencavel (1986), Blundell and Macurdy (1999), Machio (2014), and Nwosu (2015), the study adopted the standard labour supply model to analyse labour participation behaviour. The model is derived from the general consumer demand theory in which an agent is assumed to maximise utility from consumption of composite goods and leisure time. The utility function is derived on perfect certainty assumption, where an individual tends to maximise a well behaved utility function:

$$U = U(C_t, L_t; X_t, \varepsilon_t) \quad (1)$$

For  $U_C > 0, U_L \geq 0$ , and subject to the budget constraint:

$$C \leq W_t h + V_t \quad (2)$$

Where  $C$  stands for consumption;  $L$  is leisure time;  $X$  and  $\varepsilon$  are observed and unobserved human attributes that cause individual differences;  $W$  is the market wage; and  $v$  is non-labour income, all at time  $t$ .

The framework further assumes that an individual is endowed with fixed time ( $T$ ) to be allocated between work ( $h$ ) and leisure ( $l$ ); thus, the time constraint is  $T = h + l$ . This makes the full budget constraint to be given by the function:

$$C_t \leq W_t(T - l_t) + V_t \quad (3)$$

By applying Lagrange, the utility maximisation problem will be:

$$L = U(C_t, L_t; X_t, \varepsilon_t) + \lambda(V_t + W_t T - W_t l_t - C_t) \quad (4)$$

First order condition with respect to  $C$  and  $l$  gives:

$$U_C(C_t, L_t; X_t, \varepsilon_t) = \lambda_t \quad (5)$$

$$U_L(C_t, L_t; X_t, \varepsilon_t) \geq \lambda_t W_t \quad (6)$$

By substituting  $\lambda_t$  in equation (6) yields the marginal rate of substitution between leisure and consumption of composite goods ( $U_L/U_C$ ), that is:

$$\frac{U_L(C_t, L_t; X_t, \varepsilon_t)}{U_C(C_t, L_t; X_t, \varepsilon_t)} = W_t \quad (7)$$

Equation (7) indicates that, for an individual to participate in the labour market and supply a positive number of labour hours, the rate of substitution between leisure and consumption must equal the market wage rate. Note that, at corner solution or

when an individual is not working, such that  $h = 0$ , then  $L_t = T$ ; and the slope of indifference curve will be the reservation wage ( $W_t^*$ ), that is,  $U_L(C_t, T; X_t, \varepsilon_t) = \lambda W_t^*$ . The reservation wage is the explicit value of individual's time at the margin of participating and not participating in the labour market, of which if it is below  $W_t^*$ , an individual is not willing to work. Thus, the decision to participate in the labour market is governed by the following conditions:

If  $W_t > W_t^*$ , participate and supply  $h > 0$

If  $W_t < W_t^*$ , not participate and  $h < 0$

But the reservation wage varies from one indifference curve to another; depending on consumption pattern, the level of non-labour market incomes ( $V_t$ ), and given  $X_t, \varepsilon_t$  such that  $W_t^*(V_t, X_t, \varepsilon_t)$ . Therefore, health status enters reservation wage equation as one of the components of the vector of observed characteristics ( $X_t$ ) affecting reservation wage and labour participation. As a case in point, ill health is likely to increase the reservation wage and the opportunity cost of work; in other words, it increases the taste for leisure resulting to reduced participation in the labour market. Thus, in this case, ill health status is expected to negatively affect labour market participation in Tanzania.

### **3.2 Empirical Strategy and Model Specification**

The study estimates the random effect panel probit models to examine the effect of ill health status on labour market participation in Tanzania since the outcome variable labour participation is binary, resulting from the product of longitudinal response process. As used by Iregui-Bohórquez et al. (2016), labour participation is modelled on ill health and other control variables to capture the effect of ill health on labour participation with internal validity, of which the endogeneity problem from unobserved individual heterogeneity and serial correlation is controlled by clustering respondents by household, and controlling time fixed effect. Thus, with the theoretical framework guiding analysis of labour participation behaviour, the empirical model for labour participation is specified as:

$$pr(LP_{it} = 1) = \beta_0 + \beta_1 Ih_{it} + \beta_2 A_{it} + \beta_3 A^2_{it} + \beta_4 L_{it} + \beta_5 Educ_{it} + \beta_6 Hs_{it} + \beta_7 S_i + \beta_8 Ms_{it} + \mu_{it} \quad (8)$$

Whereby  $LP$  denotes labour participation;  $Ih$  is ill health status, both chronic and acute;  $A$  is age, and  $A^2$  is age squared;  $L$  denotes location;  $Educ$  is education levels;  $Hs$  is household size;  $S$  denotes sex;  $Ms$  is marital status; and  $\mu$  is an error term. The subscripts  $i$  and  $t$  stand for an individual and time period, respectively.

### **3.3 Key Variables**

#### **3.3.1 Ill Health Status**

Ill health status in this study entails the presence of illness or other health limitations, both chronic and acute, that could affect labour market outcomes. Chronic ill health is assigned to individuals who reported long-term health problems like disabilities and diseases such as lungs and heart diseases, TB, broken bones,

HIV/AIDs, cancer, and others. Acute ill health is assigned to individuals who reported injuries, headache, fever, diarrhoea, malaria, stomach and maternity diseases for women; and other short-term ill health conditions. Two dummies were created to capture chronic and acute ill health; assigned a value of 1, if reported chronic or acute ill health; and 0 otherwise. The negative effect of ill health on labour participation is expected as it reduces work capacity, makes ill person unfit for job conditions, hence rendering him/her less competitive in the labour market. Also, ill health affects work preference and time horizon (Becker, 1975; Bloom & Canning, 2005; Dwyer & Mitchell, 1999; Machio, 2014). This reduces the likelihood of participating in the labour market, and may in turn result into low earnings.

### 3.3.2 Labour Participation

Labour participation is measured by dummies capturing people who actively engaged or participated in the labour market in the last twelve months, either by being employed or unemployed, but have been actively seeking jobs in the labour market. It is the categorical binary outcome variable assigned a value of 1 if an individual participated in various labour market activities, or has been actively seeking a job; and 0 otherwise ( $pr(LP_{it} = 1)$ ).

## 4. Data and Descriptive Statistics

### 4.1 Data Sources

The study used panel data extracted from the Tanzania national panel surveys (NPSs) wave two (2010/11), three (2012/13) and the extended national panel of 2019/2020 capturing the latest information on health and labour markets in the country. The NPSs are conducted by the National Bureau of Statistics to collect essential information on various topics, including among many, health and labour market outcome indicators. The data are collected for tracking welfare transitions in Tanzania; as well as for planning, policy formulation processes and assessment of the progress and achievement of various national policies and initiatives.

In this study we targeted economically active population who are individuals aged between 15 and 64 years. The sample size for this study was drawn from the original NPSs datasets that used stratified and clustered random sampling techniques to obtain the overall sample size proportional to the cluster size across Tanzania. After cleaning and appending all of the three waves of national panel survey datasets, we obtained a balanced panel data totalling 3,120 observations, with all necessary information for this analysis. Also, the study utilised only three out of the five waves of the national panel surveys due to inconsistencies in the national panel surveys and the data itself. For example, the fourth wave of 2014/2015 is an independent version that traced different households that cannot be merged with other waves. Also, the first wave of 2008/09 is missing some relevant information on health and labour market status, making it unsuitable for this study.

### 4.2 Descriptive Statistics

The descriptive statistics provide in summary all basic information of the study dataset, taking into account all dependent and independent variables. This is

important for analysing the accuracy and relevance of dataset, as well as for the interpretation and discussion of the results. As presented in Table 3, it is clear that individuals suffered more from chronic ill health compared to acute ill health; whereby the prevalence of chronic ill health condition, on average, was 9.13%; and that of acute ill health was 5.96%. The highest incidences of chronic ill health were reported in 2012, which was about 10.0%; followed by 9.52% and 7.88 % in 2010 and 2019, respectively. Acute ill health has been decreasing over time from 7.21% in 2010 to 5.38% and 5.29% in 2012 and 2019, respectively. The percentages of the prevalence of both chronic and acute ill health in Tanzania depicted in the descriptive statistics explain the effect of ill health on labour market participation in the country. Table 3 jointly presents the summary statistics for the panel and each wave of the longitudinal data used in the study.

**Table 3: Descriptive Statistics**

PANEL SUMMARY					WAVE2 (2010/11)		WAVE3 (2012/13)		WAVE5 (2019/20)		
VARIABLES	Obs	Mean	Sd	Max	Min	Mean	Sd	Mean	Sd	Mean	Sd
Chronic ill health	3,120	0.0913	0.288	1	0	0.0952	0.294	0.100	0.300	0.0788	0.270
Acute ill health	3,120	0.0596	0.237	1	0	0.0721	0.259	0.0538	0.226	0.0529	0.224
LP (Participated=1)	3,120	0.845	0.357	1	0	0.725	0.384	0.905	0.294	0.911	0.285
Age	3,120	36.02	11.59	64	15	32.60	11.01	34.56	11.00	40.90	11.10
Sex (male=1)	3,119	0.459	0.498	1	0	0.459	0.499	0.460	0.499	0.458	0.498
Location (rural=1)	3,120	0.622	0.485	1	0	0.643	0.479	0.626	0.484	0.596	0.491
Marital status (married=1)	3,120	0.679	0.467	1	0	0.637	0.481	0.676	0.468	0.725	0.447
Household size	3,120	6.111	3.411	33	1	6.611	3.547	6.068	3.463	5.654	3.144
Labour supply (hours)	3,120	1,435	1,363	8064	0	1,266.3	1,310	1,458	1,323	1,580	1,328
<b>Employment sector</b>											
Agriculture	3,120	0.529	0.499	1	0	0.545	0.498	0.547	0.498	0.495	0.500
Government	3,120	0.043	0.203	1	0	0.0442	0.206	0.0433	0.204	0.0413	0.199
Private	3,120	0.126	0.332	1	0	0.114	0.318	0.130	0.336	0.134	0.340
Elementary	3,120	0.252	0.434	1	0	0.232	0.422	0.227	0.419	0.296	0.457
<b>Education levels</b>											
No education	3,120	0.142	0.349	1	0	0.134	0.340	0.133	0.340	0.157	0.364
Primary	3,120	0.664	0.472	1	0	0.673	0.469	0.668	0.471	0.650	0.477
Secondary	3,120	0.173	0.379	1	0	0.175	0.380	0.178	0.382	0.168	0.374
Tertiary	3,120	0.021	0.143	1	0	0.018	0.134	0.020	0.140	0.024	0.153

Source: Author's computation

Moreover, 84.5% of the total observation reported to have participated in the labour market with an average of 1,435 hours supplied per year in the labour market. Both labour participation and hours supplied in the labour market were increasing over time in Tanzania from 2010 to 2019. The labour participation rate by main occupation indicates that the majority in Tanzania were engaged in agricultural activities (52.9%), followed by elementary activities (25.2%); with participation decreasing in agriculture and increasing in elementary activities from 2012 to 2019. Additionally, the smallest rate of labour market participation by activity was

observed in the government sector (4.3%) and private sector (12.6%); with increasing participation in the private sector and decreasing in the government sector all over time. This can be a reflection of the current situation in the country where the government does not employ as many people as in the previous years. A majority of graduates not absorbed in the public and private sector employments now decide to join elementary activities.

Furthermore, the average age of the study population was 36; while the minimum and maximum ages were 15 and 64 years, respectively. This justifies that all respondents were economically active, and thus relevant for this study. By sex structure, the summary statistics indicate that there were more females in the study population compared to males: on average, females accounted for 54.1% compared to males who made up 45.9% of the total observation. By locality, the majority were living in rural areas (62.2%); and had primary education (66.4%). The marital status indicates that the majority were married (67.9%). On average, the household size of the study population was 6 members; whereas the largest household had a maximum of 33 members, and the lowest had 1 member.

### 5. Empirical Results and Discussion

In examining the effect of ill health status on labour market participation in Tanzania, labour participation was regressed to ill health status. First, the bivariate regression analysis was performed; with labour participation being regressed to both chronic and acute ill health without control variables, just to test if there is statistically significant correlation between ill health status and labour participation in Tanzania. As presented in Table 4, the results for the bivariate regression concluded the presence of a significant negative correlation between chronic illness and labour participation, while no significant correlation was found for acute ill health. Columns 1 and 2 in Table 4 are the marginal effects of chronic and acute ill health, respectively.

**Table 4: Marginal Effects from Random Effects Probit Bivariate Regression of Labour Participation Model**

Independent Variable (Ill Health Conditions)	(1)	(2)
Chronic ill health	-0.0419** (0.0231)	
Acute ill health		-0.0306 (0.0279)
Time unit specific effects		
2012	0.281*** (0.0210)	0.281*** (0.0210)
2019	0.286*** (0.0208)	0.286*** (0.0209)
<i>N</i>	<b>3120</b>	<b>3120</b>

Note: Standard errors in parentheses; \* p<0.10, \*\* p<0.050, \*\*\* p<0.010

Source: Author's computation

Secondly, the causal effect of ill health on labour participation was estimated with control variables. where the random effects panel probit models of labour participation were estimated separately: one with chronic ill health, and the other with acute ill health. The results are presented in Table 5. Also, further empirical analyses were performed by sex and locality and the results are presented in Tables 6 and 7, respectively.

**Table 5: Marginal Effects from Random Effects Panel Probit Regression of Labour Participation Models**

<b>Independent Variables</b>	<b>(1)</b>	<b>(2)</b>
Chronic ill health	-0.0492** (0.0222)	
Acute ill health		-0.0128 (0.0275)
Age	0.0197*** (0.00355)	0.0195*** (0.00359)
age <sup>2</sup>	-0.000240*** (0.0000466)	-0.000240*** (0.0000470)
Sex (male=1)	0.130*** (0.0130)	0.129*** (0.0131)
Location (rural=1)	0.0125 (0.0150)	0.0132 (0.0150)
Marital status (married=1)	-0.0163 (0.0147)	-0.0122 (0.0148)
Household size	-0.0599*** (0.0189)	-0.0570*** (0.0189)
<b>Education levels</b>		
Primary	0.0319* (0.0195)	0.0345* (0.0196)
Secondary	-0.0151 (0.0278)	-0.0111 (0.0279)
Tertiary	0.0451 (0.0615)	0.0496 (0.0613)
<b>Time unit specific effect</b>		
2012	0.268*** (0.0207)	0.268*** (0.0207)
2019	0.266*** (0.0217)	0.267*** (0.0216)
<b>N</b>	<b>3119</b>	<b>3119</b>

**Note:** Standard errors in parentheses \*  $p < 0.10$ , \*\*  $p < 0.050$ , \*\*\*  $p < 0.010$

**Source:** Author's computation

In Table 5, the marginal effects coefficients of estimated labour participation models with chronic ill health are in column 1, and acute ill health in column 2. Table 6 presents the regression results by sex, with the marginal effects coefficients of the estimated labour participation models with chronic and acute ill health in columns 1 and 2 for males, and columns 3 and 4 for females.

Table 6: Marginal Effects Results of Labour Market Participation by Sex

Independent Variables	Males		Females	
	(1)	(2)	(3)	(4)
Chronic ill health	-0.0592** (0.0249)		-0.0389 (0.0331)	
Acute ill health		-0.0639 (0.0394)		0.0113 (0.0377)
Age	0.00157 (0.00428)	0.00141 (0.00432)	0.0310*** (0.00546)	0.0307*** (0.00547)
Age <sup>2</sup>	-0.000455 (0.000552)	-0.000488 (0.000560)	-0.00377*** (0.000741)	-0.00374*** (0.000742)
Location (rural=1)	-0.0573*** (0.0163)	-0.0574*** (0.0160)	0.0718*** (0.0237)	0.0727*** (0.0237)
Marital status (married=1)	0.106*** (0.0190)	0.111*** (0.0189)	-0.0957*** (0.0216)	-0.0917*** (0.0218)
Household size	0.0603*** (0.0167)	0.0555*** (0.0174)	-0.0749*** (0.0277)	-0.0734*** (0.0277)
<b>Education level</b>				
Primary	0.0170 (0.0260)	0.0184 (0.0259)	0.0604** (0.0294)	0.0629** (0.0298)
Secondary	0.00608 (0.0313)	0.00942 (0.0309)	-0.0195 (0.0432)	-0.0163 (0.0435)
Tertiary	0.0466 (0.0545)	0.0488 (0.0542)	0.0595 (0.105)	0.0631 (0.105)
<b>Time unit specific effects</b>				
2012	0.240*** (0.0232)	0.243*** (0.0230)	0.292*** (0.0270)	0.293*** (0.0270)
2019	0.258*** (0.0222)	0.260*** (0.0220)	0.273*** (0.0302)	0.274*** (0.0301)
<i>N</i>	1431	1431	1688	1688

Note: Standard errors in parentheses \* p<0.10, \*\* p<0.050, \*\*\* p<0.010

Source: Author's computation.

Table 7 presents the regression results by locality having coefficients of marginal effects of the estimated models of labour participation with chronic and acute ill health in columns 1 and 2 for urban, and columns 3 and 4 for rural areas, respectively. The results suggest that chronic ill health had a significant negative effect on labour participation in Tanzania, where being chronically ill resulted to a significant reduction in the probability of participation in the labour market by 4.39 percentage points. In contrast, acute ill health is found having statistically insignificant effect on labour market participation. However, it is significant and negative in rural areas. The difference in the effects between chronic and acute ill health status on labour participation can be explained by the fact that chronic ill health last for a long time, making a chronically ill person spend more time off work to take care of own health, while acute ill health persons resolve relatively in a short period of time to get back to their jobs as shortly as they become normal (Machio, 2014; Mwabu, 2007). Also, sometime the acutely ill keep on working especially when suffering from less severe acute illnesses like small injuries and headaches (Cai & Kalb, 2004; Dwyer & Mitchell, 1999). Thus, the insignificant effect of acute ill health on labour market participation is not surprising.



**Table 7: Marginal Effects Results of Labour Market Participation by Locality**

Independent Variables	Urban		Rural	
	(1)	(2)	(3)	(4)
Chronic ill health	-0.0536** (0.0270)		-0.0583* (0.0352)	
Acute ill health		0.0602 (0.0397)		-0.106*** (0.0377)
Age	0.0140*** (0.00416)	0.0134*** (0.00419)	0.0310*** (0.00621)	0.0298*** (0.00613)
age <sup>2</sup>	-0.00189* (0.00113)	-0.00184*** (0.000567)	-0.00355*** (0.000792)	-0.00346*** (0.000788)
Sex (male=1)	0.0970*** (0.0146)	0.0984*** (0.0146)	0.191*** (0.0234)	0.185*** (0.0240)
Marital status (Married=1)	0.0149* (0.0182)	0.0223* (0.0186)	-0.0441* (0.0231)	-0.0424* (0.0228)
Household size	-0.0861*** (0.0210)	-0.0824*** (0.0202)	-0.0179 (0.0343)	-0.0189 (0.0339)
<b>Education level</b>				
Primary	0.0386* (0.0198)	0.0428** (0.0202)	0.0594 (0.0563)	0.0600 (0.0578)
Secondary	-0.0487 (0.0327)	-0.0425 (0.0327)	0.0428 (0.0613)	0.0462 (0.0628)
Tertiary	-0.0637 (0.103)	-0.0551 (0.102)	0.194*** (0.0594)	0.194*** (0.0614)
<b>Time unit specific effects</b>				
2012	0.353*** (0.0270)	0.355*** (0.0268)	0.125*** (0.0268)	0.125*** (0.0266)
2019	0.368*** (0.0263)	0.370*** (0.0262)	0.0936*** (0.0326)	0.0963*** (0.0315)
<b>N</b>	<b>1939</b>	<b>1939</b>	<b>1180</b>	<b>1180</b>

**Note:** Standard errors in parentheses \* p<0.10, \*\* p<0.050, \*\*\* p<0.010

**Source:** Author's computation

When regressed by sex, chronic ill health was found significant and negative on male participation in the labour market; of which being a chronically ill male results to a reduction in the probability of participating in the labour market by 5.92 percentage points, compared to non-ill male. Both chronic and acute ill health conditions are statistically insignificant for female participation. This can be explained by gender discrimination in the labour market, where males participate more in the labour market than females as they play provider roles in their families, while in many cases females perform non-labour market activities at home. This could have possibly made the effect of ill health on labour participation more pronounced to males than females.

By locality, a strong effect of ill health status was observed in rural areas where both chronic and acute ill health conditions were found having significant negative effects on labour participation. The marginal effects indicates that being chronically and acutely ill result into a reduction in the probability of participating

in the labour market by 5.83 and 10.6 percentage points, respectively, in rural areas. In urban areas, only chronic ill health status is found significant and negative on labour participation; of which being chronically ill reduces the probability of participating in the labour market by 5.36 percentage points. This can be due to the fact that most of the economic activities done in rural areas, like agriculture, require more of physical fitness; and are often family labour-oriented. Thus, ill health strongly affects individual participation in these activities in rural compared to urban areas where even the ill can participate in light works or hire other people. Additionally, it can be a reflection of poor health services in rural areas where people are completely overwhelmed and unable to work when sick, compared to urban areas where the ill get timely treatment and resume their jobs, especially when suffering from acute illnesses.

These findings support the theory of human capital, and are consistent with other studies like Lushaju (2019), who found a significant negative effect of chronic illnesses on labour participation in Tanzania. Also, studies conducted outside Tanzania with similar results include Machio (2014), who found both chronic and acute ill health having significant negative effects on labour participation in Kenya; and Matovu et al (2012), who found a significant negative effect of ill health on labour participation in Uganda. Furthermore, Cai and Kalb (2004), Bridges and Lawson (2008), Devaux and Sassi (2015), Doğrul (2015), Sengupta (2017), Lenhart (2019), and Antczak and Miszczyńska (2021): all found negative effects of ill health on labour participation.

The results for other control variables show that both age and age-squared have significant effects on labour market participation; with age having a positive effect, and age-squared having a negative effect. The marginal effects coefficient indicates that, an increase in age of an economically active person by 1 year results to an increase in the probability of one's participation in labour market by 1.97 percentage points. However, by sex, age is found insignificant for males; implying that economically active males participate in the labour market regardless of their age. Also, age is found significant and positive with the strong effect in rural compared to urban areas, implying that people participating in labour market at lower age in rural compared to urban areas of Tanzania. The positive effect of age on labour participation could be explained by the fact that people get more experienced, create connections and become more responsible with age, especially when they have families and dependants; which makes them participate more as they grow up at their active ages. The negative effect of age-squared implies that, later at very old ages, people become less likely to participate in the labour market due to inactivity.

Sex has a very strong significant positive effect on labour market participation in Tanzania: being a male results to an increase in the probability of participating in the labour market by 13 percentage points compared to females. A strong effect is observed in rural areas where rural males are 19 percentage points more likely to participate in the labour market compared to females. Urban males are 9.7 percentage points more likely to participate in the labour market compared to females. These findings are similar with those of Bridges and Lawson (2008), and

Machio (2014), where males were found more likely to participate in the labour market than females. This can be explained by the established gender role in the society where, in most cases, men perform the provider role (i.e., men are bread winners in their families), while women are caretakers (Zuo & Tang, 2000). Additionally, it can be explained by the male muscular identity, where men in the society are seen as stronger and more energetic; all of which attribute to higher participation of males in the labour market compared to females.

By sex disaggregation, location is found statistically significant and negative on male's participation, and positive on female's participation in Tanzania. The marginal effect coefficients indicate that rural males are 5.7 percentage points less likely to participate in the labour market compared to urban males, while rural females are 7.2 percentage points more likely to participate in the labour market compared to urban females. Losindilo et al (2010) had similar findings. This could possibly be due to the fact that urban men feed their families from employment, daily labour work; and others from own businesses: so, they are forced to work every day to meet their daily needs, compared to rural men who depend on agriculture that is seasonal; and which is also performed by family labour of women and children. Likewise, the high participation of rural females in labour market compared to those in urban areas can be possibly be due to the free access to agriculture and other economic activities in rural labour markets compared to urban areas where there are limited job opportunities.

Marital status was found significant and positive for married men, and negative for married women, as expected. Being a married man resulted into an increase in the probability of participating in the labour market by 11 percentage points compared to unmarried man. This supports the finding by Machio (2014), who found that married males are more likely to participate in the labour market. Furthermore, a married woman was 9.57 percentage points less likely to participate in the labour market compared to an unmarried woman. This is in line with the findings by Bhattarai and Wisniewski (2000). The findings can be due to established gender roles: that men bear higher responsibilities than women to sustain their families, necessitating them to work to meet family needs. Also, the less participation of married women in the labour market compared to their unmarried counterparts can be attributed to the fact that married women have other non-labour market income sources, e.g., from husbands and/or small savings. This increases their reservation wage; hence, making them less likely to participate in the labour market compared to unmarried women.

Moreover, household size was found having a significant negative effect on labour market participation, implying that having one more household member results into the reduction in the probability of participation in the labour market by 5.9 percentage points. However, by sex, having more males in a household results into a significant positive effect on labour participation: having 1 more male member in a household results into increased participation in the labour market by 6 percentage points, whereas having 1 more female member in the household results into a reduced participation in the labour market by 7.4 percentage points.

Furthermore, the effect is high in urban areas where having 1 more member in an urban household results into a significant reduction in labour market participation by 8.6 percent points; while in rural areas it leads to 1.8 percentage points reduction in labour market participation. This is different from what was expected, and contradicts the study findings by Lushaju (2019) and Mduma and Wobst (2005b). This may in fact reflect that having many household members—especially females—does not directly translate to high participation, but it may find that only the head of household is working. This is justified in the analysis by sex and location, where having many male household members result to increased labour market participation, as opposed to females. Also, the effect is high in urban areas, reflecting the actual situation in many households where only the head is working in a big household, while others are jobless (Bhattarai & Wisniewski, 2000).

Moreover, lower education status was found having a significant positive role on labour market participation in the country. Having primary education is positive and significant on labour market participation compared to having no formal education; whereas higher education is statistically insignificant as found by ILO (2020). This is possibly due to the informality in the local labour market, where people with low education opt for any available job compared to those with higher education, who in most cases opt for jobs that are suitable for their profession. This makes those with lower education easily get jobs and highly participate in the labour market compared to those with higher education.

## **6. Conclusion and Policy Implications**

### **6.1 Conclusion**

The objective of this paper was to examine the effect of ill health status on labour market participation in Tanzania using panel methods with data extracted from three waves of the NPS datasets of 2010/11, 2012/13, and the extended panel of 2019/2020. The causal effect of ill health on labour market participation was examined by estimating two random effects panel probit models of labour market participation separately: one with chronic, and the other with acute ill health. The results show that chronic ill health status has a significant negative effect on labour market participation in Tanzania. A strong effect of ill health status is observed in rural areas where both chronic and acute ill health conditions are significant and negative on labour participation when regressed by locality. By sex, the findings suggest that chronic ill health is significant and negative on male's participation in the labour market.

### **6.2 Policy Implications**

The significant negative effect of ill health status -- both chronic and acute -- found on labour market participation in Tanzania implies that diseases and other health limitations strongly affects the rate of participation in the labour market, and put many people off work. Therefore, the study recommends the adoption of more effective policies and interventions to reduce the prevalence of chronic and acute illness to bring more Tanzanians into the labour force. Also, it recommends mainstream employment policy actions such as enabling work environments to support those with partial work capacity, caused by incurable ill health conditions, to take up jobs.

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