A NON-LINEAR DECOMPOSITION OF THE EFFECTS OF SOCIAL GRANTS ON ACUTE RESPIRATORY TRACT INFECTIONS IN SOUTH AFRICA

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DECLARATION

I Sindiso Ndlovu declare that this report is my own work. It is being submitted to the Faculty of Humanities, University of the Witwatersrand, in partial fulfilment of the degree Master of Arts in Demography and Population Studies. This research report has not been submitted, in part or in whole to any other Institution or University as a requirement for any other qualification.

Signature: ..... Date: .....

ABSTRACT

Background

Acute respiratory tract infections (ARTIs) are a leading public health challenge. Annually 2.6 million deaths among children aged below 5 years result from respiratory tract infections. There is an acknowledged synergism noted to exist between poverty and contraction of ARTIs. Children in poor households are at greater risk of developing respiratory tract infections. In South Africa, poverty levels post-1994 have been associated with socio-economic inequalities inherited from the apartheid system. The South African government therefore adopted a policy of social assistance involving monthly payment of social grants to deserving persons in order to ameliorate poverty and its consequent effects on health. One of the expected social impacts of the social grants besides reducing incidences of poverty is a reduction in health conditions like ARTIs that are linked to poverty. Poverty alleviation policies in form of social assistance are mostly non-existent in sub-Saharan Africa. South Africa is one of rare cases with an advanced social assistance policy in SSA. The country thus provides a platform for examining the impact of such policies on health outcomes like ARTIs. The study therefore seeks to examine if there an association between social grants and ARTIs in children aged below 5years in South Africa.

Methodology

This study analysed secondary data obtained from the 2016 General Household Survey (GHS2016), which is an annual household survey conducted by Statistics South Africa (Stats SA). The study population for this research comprised all children in South Africa aged between zero and 5 years in 2016. A total of 7,156 children aged below 5 years enumerated in the GHS2016 made up the study sample. Data about these children were collected from guardians or parents of the children. Data analysis was done in three phases; the univariate included conducting the background characteristics of the respondents using a series of frequencies and percentage distributions. The bivariate analysis involved the cross tabulation of the outcome variable (ARTIs) with all independent variables using the Pearson's chi-square test. The multivariate analysis was conducted to determine the net effects of social grants on ARTIs in children aged below five years. The logistic regression was applied to determine the extent to which a range of predictor variables are related to the existence of ARTI in a child. The threefold Blinder-Oaxaca decomposition technique was then applied to quantify the conditional contributions of social grants and other predictor variables to differences in proportions of children who had ARTI between two groups of children. Group

1 was made of children residing in urban areas while group 2 was for those living in rural areas.

Results

This study observed that 15% of the total number of children aged below 5 years who were enumerated in the South African GHS2016 were reported to have had ARTIs. Logistic regression results showed that reception of a grant relative to no grant was associated with higher likelihood of ARTIs. Old age grant was associated with 53% (OR 1.53; CI 1.18- 1.97) and the child support grant 29% (OR 1.29; CI 1.03 -1.60) higher likelihood of ARTIs. Results on the age of child showed significance at the at the age 1 year and 2 years, controlling for other variables a child aged 1 year had a 46% higher likelihood of ARTI in comparison to a child aged below 1year (OR 1.46; CI 1.18 – 1.81). Children residing in households of rich socioeconomic status had 3 times higher odds of ARTI compared to the poor. There was a statistically significant association between mothers' educational attainment (at secondary and tertiary level) and ARTI, children with mothers who have secondary education had a 27% higher likelihood of ARTI while tertiary education further increases the likelihood by 78% of ARTI relative to non-educated.

The level of ARTIs was higher among children from urban areas (group 1; 18%) compared to that of children living in rural areas (group 2; 12%), indicating a gap of 6 percentage points. Using group 1 as the reference, decomposition results showed that holding all effects and interaction constant and allowing for change in endowments only, the level of ARTIs would increase by 5.6 percentage points. Allowing for change in coefficients (p. value < 0.05), holding endowments and interaction would lead to a 66 percentage point decrease in ARTIs. If returns to characteristics for the Old age grant were transferred to urban areas, holding all other variables constant- ARTIs would decrease by 5 percentage point (p. value <0.05). Furthermore, if those if returns to characteristics for the child support grant were transferred to urban areas, holding all other variables constant ARTIs would decrease by 9% (p. value <0.05).

Conclusion

This study established that social grants have a protective effect in reducing ARTIs among the poor, wider coverage of social protection will yield better health outcomes in children as means to join the global agenda to alleviate child poverty and improve well-being.

Keywords: Acute Respiratory Tract Infections, Social grants, Decomposition, South Africa, Children

DEDICATION

To my daughter Tanatswa Noluthando, may this be a lesson in the years to come- no matter how hard the fall is, crawl if you may, you just have to soldier on. Failure is not an option!

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Foremost I give praise and glory to the Almighty who has seen me through all the trials and tribulations.

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ABBREVIATIONS

ARTIs	Acute respiratory tract infections
BEAM	Basic Education Assistance Module
CSG	Child Social Grant
DG	Disability grant
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immune Deficiency Virus
RTIs	Respiratory Tract Infections
SASSA	South African Social Security Agency
SES	Socio-economic status
SOAP	State Old Age Pension

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CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Background

Social assistance grants refer to non-contributory and income tested benefits financed out of general tax revenues which are provided by the state as measures to ameliorate poverty, increase investment in health, education and nutrition among the vulnerable groups (Samson et al., 2005; Woolard and Leibbrandt, 2010). As outlined in the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996), every South African citizen is by right guaranteed social protection if they are deemed incapable of supporting themselves and their dependants (Gutura and Tang, 2014; Republic of South Africa (RSA), 1996) . In South Africa social security systems have been in existence prior to independence in 1994 but were mainly a welfare system for whites thus they were overly clouded by a scenario of disproportionately underfunding South African black populace in favour of their white counterparts (Samson et al., 2005; Woolard and Leibbrandt, 2010). This meant that independence in 1994 entailed adoption of an already crippled system and fragmented social security system (Samson et al., 2005). The adoption of the 1992 Social Assistance Act allowed for rectification of the discriminatory social policies inherited from apartheid era resulting in unconditional social grants being incorporated by the government to redress inequality, poverty as well as reduce associated long-term health implications (Armstrong and Burger, 2009; Booysen, 2004; Gutura and Tang, 2014; Woolard and Leibbrandt, 2010).

South Africa has five major social security grants which are managed and administered through the South African Social Security Agency (SASSA). These include the State Old Age Pension (SOAP), Disability grant, Child Support grant, Foster Child grant and Care Dependency grant. The SOAP came into effect due to the enactment of the Old Age Pensions Act in 1928 (Adato and Bassett, 2009; Gutura and Tang, 2014; Samson et al., 2005). Beneficiaries of this cash transfer system should meet the age criterion of 60 years and older to qualify for a total monthly allowance of ZAR1600 (Statistics South Africa, 2016). The Disability Grant (DG) is also dated back to 1937 and was extended on grounds of explicit exclusion of blacks, it provides a monthly income of ZAR1600 to adults aged between 18 and 59 years who have submitted medical assessment report confirming disability (Gutura and Tang, 2014; Samson et al., 2005).

The Child Support Grant (CSG) was introduced around 1987 but also resulted in a miniature of blacks being recipients, it was only after the 1995 Lund Committee on child and family support that appropriate recommendations were incorporated by the government in 1998 to make it a developmental as well as progressive social welfare system (Lund, 2008; Samson et al., 2005). To date, eligible families meeting the income threshold receive monetary assistance of ZAR380 per month per child aged 18 years and below (Stats SA, 2016). The Foster Child Grant provides support to families with children below the age of 18 in foster care, the value of this grant stands at ZAR920 per month for each qualified beneficiary (Samson et al., 2005). Care dependency grant provides additional support to families with children below the age of 18 years with permanent or severe disabilities (Booysen, 2004; Nattrass, 2006).

Over the years the uptake of social grants has been marked by a constant increase, in 2016 a total of 29.7% individuals of the total South African population were benefiting from state funded social safety nets as compared to only 12.7% recorded in 2003 (Samson et al., 2005; Statistics South Africa, 2016) . On a household level, reception of at least one grant increased by 25% between 2003 and 2016 with statistics reporting that 44.8% of households received at least one grant in 2016 compared to 29.9% in 2003 (Samson et al., 2005).

Critics of social security cash transfers have argued that social grants create a dependency syndrome, are associated with inadequate coverage of the working age and incentivise teenage fertility (Devereux, 2011; Kubheka, 2013). However, other scholars have refuted the view that child social grants increase teenage fertility, arguing that they aid poverty reduction by assisting recipients in securing basic subsistence, improving school attendance and food security among the vulnerable groups (Adato and Bassett, 2009; Devereux, 2011; Dinbabo, 2016; DSD et al., 2012; Makiwane et al., 2006).

In sub-Saharan Africa, the introduction of social protection has been observed to play a remarkable role in self-esteem, food security and the overall poverty. In Kenyan context conditional grants were introduced and a were observed to impact positively in improving school attendance, nutritional status and optimism on the future (Ayuku et al., 2014). Between 2005 and 2008, social transfers in countries like Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe proved to impact positively on the recipients' lives as the food security and nutrition improved (Vincent and Cull, 2009). The social transfers were also

found to improve social empowerment and reduced poverty significantly (Vincent and Cull, 2009). Nonetheless, the full extent of the impact of social security cash transfers on outcomes like health status has still not yet been exhaustively explored in African context. Although existing body of literature has contributed immensely to current understanding of effects on social grants in South Africa, there is need for further research focusing on child outcomes. It is against this backdrop that this study examined the net effects of social grants on child health measured in ARTIs. The focus on all social grants was because it is not only the child support grant that is used by households to cater for the needs of children as general utilisation of all grants impacts on household socioeconomic standing and ultimately benefits children.

Health dynamics among South African population in past two decades have been characterised by increased mortality rates virtually in all age groups as a consequent result of complex and rapid health transition (Kahn, 2011; Mayosi et al., 2012; Naicker and Ashuntantang, 2017). On the other hand high unemployment rates, skewed distribution of income and a large number of the population living in poverty still pervade the South African status quo despite government initiatives to redress blemishes left behind by apartheid regime (Bahre, 2011; Gutura and Tang, 2014; Pauw and Mncube, 2007).

Underdevelopment and impoverishment disposes individuals to higher risks of morbidities and infections (Khalek and Abdel-Salam, 2017; Smith et al., 2000).Such morbidities include ARTIs especially in children aged below 5years and these have generally been observed to be among the leading health issues among children in the developing world (Khalek and Abdel-Salam, 2017; Ujunwa and Ezeonu, 2014). Studies have shown that 99% of the 15 million episodes of respiratory tract infections recorded in 2010 among children were from developing countries and caused 265 000 deaths (Nair et al., 2013).

1.2 Problem Statement

The health of children is highly important; therefore accurate determination of factors that improve child survival plays a crucial informative role to further prioritise improvements (Liu et al., 2015). Acute respiratory Tract Infections have been observed to be a grave catastrophe on the health of children as well as on public health, globally it is estimated that ARTIs are the third major burden of disease leading to mortality and morbidity (Abdou et al., 2017; Elsharkawy et al., 2018; Khalek and Abdel-Salam, 2017) . Annually a total of half a million

deaths among children is attributed to ARTIs, most of these densely concentrated in the developing countries (Khalek and Abdel-Salam, 2017; Ujunwa and Ezeonu, 2014).

In 2010 alone, the developing countries experienced a burden in ARTIs resulting in an estimated total of 15 million episodes which were further linked to 265 000 deaths among children (Nair et al., 2013). Studies have however noted that there is a general paucity in epidemiological data on RTIs in South Africa; yet these respiratory tract infections cause higher rates of mortality among children below five years and potentially reduce the effectiveness of highly active antiretroviral treatment (HAART) among those living with HIV(Cohen et al., 2015). In the context of South Africa where less than 30% of children with HIV are on HAART (Cohen et al., 2015), it is vital to understand the impact of social policies on ARTI among children. Given the goal of achieving an HIV-free generation and ending HIV-related deaths, rounded understanding of socio-economic determinants of medical conditions like ARTI is important for effective policy formulation. There is dearth of epidemiological data and literature on socioeconomic determinants of RTIs among children in sub Saharan Africa and especially in South Africa which is burdened with the highest population living with HIV. This therefore deters the nation in implementation, tracking and informing policies that further aid in the global goal of attaining good health and wellbeing for all.

Wreckages of the discriminatory apartheid system have been inherited into the existent status in South Africa, these have been observed to impact on the poverty and health care and status especially of children (Seekoe, 2015). Poverty in children has been noted to have consequent outcomes such as less likelihood of vaccination and consultation with a physician, high likelihood of smoking and overweight (Armstrong and Burger, 2009; Seekoe, 2015; Triegaardt, 2005). Other observed adverse health outcomes associated with child poverty encompass high incidence of asthma, cancer, teenage pregnancy and heart disease (Lustig and Strauser, 2007; Mashita, 2014; Seekoe, 2015).

Acute respiratory infections are concentrated in disadvantaged contexts characterised by underdevelopment and poverty. Generally, being in a poverty-stricken situation predisposes children to have higher likelihood of even poorer health outcomes. Furthermore, children from poor households that are incapable of affording cleaner sources of energy are exposed to disproportionately high amounts of indoor pollution emanating from biomass energy use thus

leaving them at greater risk of contracting and developing respiratory tract ailments (Mashita, 2014; Smith et al., 2000).

Poverty alleviation policies in form of social assistance are mostly non-existent in sub-Saharan Africa; South Africa is one of rare cases with an advanced social assistance policy in SSA. The country thus provides a platform for examining the impact of such policies health outcomes like ARTIs. To qualify to be recipient of social assistance, one has to be within the threshold of being classified as poor and incapable of self-sustenance as well as that of their beneficiaries. Existing studies have investigated the health outcomes of the poor children in comparison to the child support grant, excluding the other social grants (Coetzee, 2013; DSD et al., 2012). This is despite that, considering the living arrangements of households where children are found in South Africa, all grants are potentially used towards the upkeep of children. The focus on child support grant (worth ZAR360 per month) presents a view that it is the only grant against which child health outcomes can be interpreted as compared to old age grant (ZAR1600 per month) and Foster Care (ZAR920 per month).

1.3 Justification

The health of children is of high importance and therefore calls for elimination of mortality and morbidity of children to be prioritised (Liu et al., 2015). Global initiative promulgates for child survival past the fifth birthday and elimination of avoidable and treatable infections that lead to mortality among infants. The Millennium Development Goal (MDG) Number 4 which pertained to child mortality reduction, was maintained in the Sustainable Development Goals 3 (SDGs) framework which sets the yardstick of reducing child mortality rates to 20 deaths or fewer per 1000 live births in all countries by 2035 (Fischer Walker et al., 2013). This encompasses ensuring healthy lives and promoting wellbeing among children (You, Wardlaw, Salama, & Jones, 2010). To comprehensively achieve set targets and milestones, there need to reduce infection and mortality caused by treatable diseases such as ARTIs that are associated with poverty. An understanding of the net impact of each grant on the health outcomes of children in South Africa in a multivariate analytical framework is crucial for future planning. Given the continued existence of inequality and poverty in South Africa, evidence-based understanding of the effect of cash transfers on child outcomes like ARTIs remains relevant because it enhances the design of more effective social spending frameworks and inform health care services.

1.4 Research Question

- Is there an association between social grants and ARTIs in children aged below 5 years in South Africa?

1.4.1 Sub Questions

i. What are the levels of ARTIs among children aged below 5 years in South Africa?
ii. What is the net effect of social grants on respiratory tract infections?
iii. To what extent do social grants explain differentials in ARTI between children who live in urban areas and those that live in rural areas?

1.5 Research Objective

- To examine the association of social grants on ARTI among children aged below 5 years in South Africa.

1.5.1 Sub-Objectives

i. To describe the levels of ARTIs among children aged below 5 years in South Africa.
ii. To examine the net effect of social grants on respiratory tract infections.
iii. To estimate the extent to which social grants explain the differentials into ARTIs between children who live in urban areas and those that live in rural areas.

1.7 Definition of terms

Respiratory tract infections: Heterogenous and complex group of diseases caused by a wide range of pathogens in which the anatomic sites extends from the pharynx to the alveoli (Dasaraju and Liu, 1996; Khalek and Abdel-Salam, 2017).Acute lower respiratory tract infections causative agents are viral and bacterial and they affect airways from the trachea and bronchi to the bronchioles and the alveoli (Dasaraju and Liu, 1996; Khalek and Abdel-Salam, 2017).

Social grants: Social assistance grants refer to non-contributory and income tested benefits financed out of general tax revenues which are provided by the state as measures to ameliorate poverty, increase investment in health, education and nutrition among the vulnerable groups (Samson et al., 2005; Woolard and Leibbrandt, 2010).

Decomposition: The act of partitioning a unit into identifiable constituent parts. In this study, the technique was applied to quantify the contributions to group differences in average predictions from multivariate models (Bauer and Mathias, 2007; Powers et al., 2011). Multivariate decomposition approach is applicable to many demographic outcomes and is

useful for models that are nonlinear in parameters such as binary response. The goal of decomposition is to partition a difference in mean values between two groups into components owing to group differences in observed characteristics, group differences in the estimated effects of those characteristics based on a regression model, and an interaction term (Powers et al., 2011)

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews international and local literature on social protection and respiratory tract infections. It further outlines the different roles and impact social protections have among their recipients as well as a review on child health outcomes and associated covariates. The chapter proceeds to provide a discussion of the theoretical and conceptual framework guiding this study.

2.2 Brief review of the literature

The health of children is of great importance and child mortality should be eliminated to promote child survival past the age of 5 years (Fischer Walker et al., 2013). To best address the issue of child survival, reasonable and accurate data from causes of child deaths play a crucial informative role in order to prioritise improvements (Liu et al., 2015). In 2013, sub-Saharan Africa alone contributed 49.6% (6.3 million) of all under 5 deaths worldwide and more than half of these deaths (51.8%) were due to infectious causes (Liu et al., 2015; Lopez et al., 2006).

Worldwide studies have proved that Acute Respiratory Tract Infections are one of the leading public health problems resulting in high levels of morbidity and mortality in children aged below 5 years (Khalek and Abdel-Salam, 2017; Ujunwa and Ezeonu, 2014). The highest incidence rates are recorded among infants, children and the elderly and more pronounced in low and middle income countries (Khalek and Abdel-Salam, 2017). On average 6 to 8 episodes of ARTIs globally are reported during the first 5 years of life (Ujunwa and Ezeonu, 2014). In most severe cases, if these infections are untreated they result in pneumonia episodes which account for a further 15% of under 5 mortality cases annually (Gebertsadik et al., 2015; Khalek and Abdel-Salam, 2017). The RTI related mortality cases are 2 to 6 times higher in developing nations as compared to the developed counterparts and in total 50% of all the cases are in developing nations (Gebertsadik et al., 2015; Ujunwa and Ezeonu, 2014). In 2010 estimations from a systematic analysis reported that approximately 15 million episodes of respiratory tract infections led to hospitalisations worldwide and 265 000 deaths in young children of which 99% of them were concentrated in developing nations (Gebertsadik et al., 2015; Nair et al., 2013).

2.2.1 Health outcomes and socio-economic status

Literature has shown that respiratory tract infections contribute to approximately 20% of child deaths infections (Pelletier et al., 1995). The highest proportions of the deaths have been recorded among the poor and there exists a synergism between poverty and infections (Pelletier et al., 1995). Poverty stricken environments act as a catalyst in exacerbating levels of infections thus consequentially affecting the overall health of individuals especially children (Gebertsadik et al., 2015). Lower socio-economic status is correlated with increased risks of nearly every major causes of death, there exists a gradient in health across the socioeconomic status hierarchy whereby the higher the level of household income wealth, education or occupational ranking, the lower the risks of morbidity and mortality (Berkman et al., 2014). This 'SES-related gradient' is pivotal in understanding children's health since children in low socio-economic statuses are more likely to be subject to health shocks, accidents and nutrition related disorders (Cohen et al., 2010; Currie and Stabile, 2003). Inequalities in South Africa are on the base of race and class , and the recent distributional regime has further affirmed the patterns of the advantaged (insiders) and disadvantaged (outsiders) who are further elianated impoverished and unemployed (Seekings and Nattrass, 2005). Studies utilising the decomposition technique concluded that social protection provided a relief from poverty therefore assisting in ameliorating poverty and improving SES. However, though literature has highlighted the synergism of impoverishment and acute respiratory tract infections, there is still need for an evidence-based study that clearly highlights the impact of government initiatives in forms of cash transfer have on preventable and treatable diseases such as ARTIs.

2.2.2 Health outcomes and age of child

Children below the age of 5 years are more susceptible to infections. In the first year of childhood, the incidence of respiratory tract infections is at its highest (Gebertsadik et al., 2015). A study conducted in South Nigeria concluded that there was higher incidence of pneumonia, bronchiolitis and acute respiratory tract infections cases in children aged below 20 months (Ujunwa and Ezeonu, 2014). Similarly in Iraq, a longitudinal study found that there was a high significant association observed between the age and ARI severity as 62% of all ARI occurred in the first year of childhood (Yousif and Khaleq, 2006). Below the age of 5years the children have immature bronchioles thus higher cases of infectious diseases are reported in this age group (Ujunwa and Ezeonu, 2014). The target population in the studies was all children with no particular reference to the children that have received intervention,

so as assess the impact of poverty alienation schemes on health outcomes of the children in the age where they are deemed susceptible and vulnerable.

2.2.3 Health outcomes and pollution

Air pollution is a significant cause of morbidity and mortality and its severest and greatest health impact worldwide occur among the poorest and most vulnerable populations (Smith et al., 2000). In South Africa the mushrooming of peri-urban settlements has been accompanied with use of alternative sources of cooking and heating like paraffin, wood, coal and biomass fuels and often in poor ventilated homes which contribute to rise in indoor air pollution (Vanker et al., 2018). Solid fuels used in homes cause health complications and children living in these houses are found to be three times at greater risk of contracting respiratory tract infections (Smith et al., 2000). Furthermore, studies have also shown that it is not only the smoke from cooking fuel that is hazardous to health but also the smoke from passive smoking contributes to the prevalence of severe forms of ARTI as these affect ciliary activity of the lung parenchyma of children causing secondary infections (Ujunwa and Ezeonu, 2014). Widening gap in inequality, low family income and increase in poverty levels in South Africa has led to increase in biomass use in low income houses, this increases indoor air pollution and associated respiratory ailments among children (Gebertsadik et al., 2015; Mashita, 2014). Primary risks of RTI observed from studies include household use of high-pollution biomass fuel (charcoal, wood, dung, or straw) for cooking and household overcrowding (Gebertsadik et al., 2015)

2.2.4 Health outcomes and educational attainment

Studies have ascertained that there exists an inverse association between educational attainment of the parent and poor child health outcomes, whereby the higher the education ranking, the lower the risks of morbidity and mortality (Berkman et al., 2014). A case-control analysis in India found that there is a negative relationship between maternal education and health-seeking thus ultimately affecting health outcomes (Pillai et al., 2003). A study on ARTI in relation to educational attainment concluded that more cases of acute upper respiratory tract infections were noted among children of well-educated mothers probably due to their greater health seeking behaviour (Ujunwa and Ezeonu, 2014). Evidence from literature has therefore shown that the association between health and education varies as in some contexts the well-educated record more ailments on children while in some cases educated mothers record better health outcomes of their children.

2.2.5 Health outcomes and place of residence

Place of residence has been observed to have a statistically significant association in determining the health of children. In as much as there has been an improvement of health in America, evidence has proven that a look at major health issues, habitats of rural areas have worse health outcomes in comparison to their urban counterparts (Eberhardt and Pamuk, 2004). The impact of place of residence on ARTI showed that among studied ARTI subjects the majority of the cases were recorded in the urban areas (Gebertsadik et al., 2015; Ujunwa and Ezeonu, 2014). Contradicting to these, in Iraq rural residence were found to have a statistically significant effect on ARTI severity (Yousif and Khaleq, 2006). Differentials in place of residences' impact on health exist and these are not uniform across all health measures as some adverse measures are highest in urban areas while others are highest in rural areas (Eberhardt and Pamuk, 2004). Regions in South Africa also have presented different levels of health outcomes, Western Cape with low levels of poverty in 2000 was observed to have low mortality rates of children aged below 5years (46 per 1000 live births) in comparison Western Cape province which had rates of 116 deaths per 1000 live births in KwaZulu Natal (Coovadia et al., 2009). In the same year again, age standardised death rate from asthma (a form of respiratory tract infection) among men from Eastern Cape were 4 times higher as compared Western Cape (Coovadia et al., 2009). Literature therefore suggests that health outcomes from Western Cape are more favourable in comparison to other regions.

2.2.6 Health outcomes and health seeking behaviours

Models based in the developed world have explained medical care-seeking and use of medical services behaviour in these countries as a function of a family's predisposition to utilize medical services, its ability to obtain them, and its need to consume them (Pillai et al., 2003). In the developing countries research has shown that delay in seeking appropriate care and not seeking any care contributes to the large number of child deaths thus improving families' care seeking behaviour could contribute significantly in reducing child mortality in developing countries (Sreeramareddy et al., 2006). Estimates from the World Health Organization predict that seeking prompt and appropriate care could reduce child mortality due to acute respiratory infections by 20% (Sreeramareddy et al., 2006). Disease severity and economic status predict whether children with acute respiratory infection are taken to medical providers thus some illnesses are categorized as 'not for-hospital' and mothers play a 'waiting game' to see if the illness subsides on its own (Pillai et al., 2003).

Other factors have been noted to be associated with RTIs in developing nations, these include low birth weight, non-exclusive breast feeding, incomplete immunizations, crowding (more than seven members per household), poor nutrition, formula feeding, weaning, young maternal age, and premature birth (Khalek and Abdel-Salam, 2017; Ujunwa and Ezeonu, 2014)

2.3 Social Grants: A global perspective

Social grants, also known as social security or welfare in the developed countries, refer to the efforts made by the modern government to improve living standards of individuals or family groups whose incomes would otherwise fall below a level deemed minimal by policymakers and their constituents (Armstrong and Burger, 2009; Coatsworth, 1996). In middle income countries such as those found in Latin America social grants are still a new phenomenon having been introduced in the nineties decade as means to eradicate poverty (Osterkamp, 2014). Brazil's Bolsa Familia scheme was introduced in 2003 and is termed the largest conditional cash transfer programme benefitting in total twelve million households by 2012 (De Brauw et al., 2015; Tepperman, 2016). The scheme has been regarded as one of the successful cash transfer programmes in Latin America as it succeeded to halve extreme poverty from 9.7% to 4.3% between 2003 and 2013, improved health care utilisation and schooling (De Brauw et al., 2015; Martins and Monteiro, 2016; Shei et al., 2014; Tepperman, 2016). India also launched social assistance programmes as means to provide jobs and food to the poor (Tepperman, 2016).The developed nations offer unconditional social grants such as child policy and old age pensions and these are well established tools in social policy (Coatsworth, 1996; Osterkamp, 2014)

2.4 Social Grants: African context

In Africa a majority of the countries lack social spending frameworks since grants are resultant of funding and government initiation, thus only a few countries have a social protection floor (Devereux, 2011). In the sub-Saharan African region, only countries like South Africa, Botswana, Zambia, Malawi and Namibia cater mostly for the tax financed child grant and old age pensions (Berg et al., 2010; Osterkamp, 2014). In Kenya conditional cash transfers were incorporated as part of World Bank initiative to provide social assistance to the poor in order to impact on health and education (Ayuku et al., 2014; Fiszbein et al., 2009; Mukiira and Ibisomi, 2015; Wakadha et al., 2013). Unconditional cash transfers in South Africa, Malawi and Zambia have been observed to have positive impact on health (Adato and

Bassett, 2009). Among the beneficiaries of the Mchinji Cash Transfer programme in Malawi, a significant increase in likelihood of receiving care upon sickness was observed as compared to non-beneficiaries (Miller and Tsoka, 2007). In Zambia, the pilot Social Cash Transfer Scheme (SCTS) resulted in reduced self-reported incidence of illness among beneficiaries especially among the elderly and children (Adato and Bassett, 2009).

In the context of rising burden of poverty and natural disasters in Africa, the most recognised social transfers have been in the form of cash, vouchers, food, agricultural inputs, medicines, and school fee or health care waivers (Tschakert, 2011). In countries as Swaziland and Lesotho the elderly receive cash transfers under the social pension schemes while Malawi provides vulnerable farmers with an input subsidy programme for subsidised fertiliser and seed (Vincent and Cull, 2009). Zimbabwe has a Basic Education Assistance Module (BEAM) that provides school fee waivers to children from disadvantaged backgrounds, which allows them to continuously enrol for schooling throughout primary and secondary education (Vincent and Cull, 2009). The role of these social assistance systems has been observed to reduce the adverse effects of poverty, promote esteem, enhance empowerment of especially girls and women, and improve food security (Devereux and White, 2010; Vincent and Cull, 2009).

2.5 Grants in South Africa

During the apartheid era in South Africa, there was a central funding model which rather disproportionately underfunded the poor and catered for whites (Duflo, 2000; Neves et al., 2010). The Bill of Rights passed in 1994 gave rise to an extension of welfare to South Africans irrespective of race (van Dijk and van Driel, 2009). Due to the vast income disparities and high levels of poverty, there was an urgent need to redress the status quo so as to ultimately alleviate poverty and its consequent long term effects (Armstrong and Burger, 2009). This has seen the post-apartheid era having a central fund benefiting 25% of the South African households especially among the poor and middle-class Africans. From 1997 (three million) to 2006 (11 million) grant recipients were recorded resulting in the government spending R70 billion which was equivalent to 3.4 percent of the South African gross domestic product (Bahre, 2011; Kahn, 2011). It has been reported that close to 68% of the poor's total income comes from the social grants (Armstrong and Burger, 2009; Berg et al., 2010). The rationale behind introduction of social grants was to alleviate poverty and improve the living standards of the poor. The coming of democracy in South African is said

to have been accompanied by rising unemployment, continued poverty and inequality rates rising by 6% from 1995 to 2004 (Bahre, 2011). Survey done by the Organisation for Economic Co-operation and Development (OECD) reported that inequality and poverty in South Africa increased between 1993 and 2008 (Dinbabo, 2016; Nair et al., 2013). To date social grants in South Africa include disability grant, child support grant, old age grant, care dependency grant, foster child grant, war veterans grant, grant-in-aid and disability grant

The health outcomes of children have been studied in relation to the CSG. For instance, the Department of Social Development , conducted a cross sectional study to examine health outcomes for children in households receiving grants (DSD et al., 2012). The study looked at illness in general without outlining the specific disease(s) the grant beneficiaries are more likely to suffer from. Another study was also conducted to investigate the role of CSG on health nutrition and education focusing on weight-for-height measures and food expenditure to generally translate health and nutrition (Coetzee, 2013). It cannot be determined based on the study by Coetzee (2013) how the CSG performs in terms of improving child outcomes when compared to other grants. The impact of social grants on poverty and inequality has also investigated, this study looked at household-level poverty measures in relation to social grants and not necessarily individual outcomes (Armstrong and Burger, 2009). Consequently, there is still lack of scientific evidence to quantify the relative importance of the different social grants in relation to the existence of ARTIs among children.

Cross sectional studies carried out in Kenya among orphans and vulnerable groups and in South Africa among recipients of Child Social Grants proved that cash transfers have a preventative measure on ill health and in improving nutritional status and school attendance among children (Ayuku et al. 2014; van Dijk and van Driel 2009). The social protection intervention, whether conditional or not has proved to make remarkable improvements on livelihoods and well-being of individuals and recipients (Devereux and White, 2010; Neves et al., 2010; Vincent and Cull, 2009).

2.6 Theoretical Framework

The theory guiding this research is the Social determinants of health (SDH), this framework came about after World Health Assembly of 2004, whereby the WHO Director-General announced the need for setting up a process to address the social causes of illness, health inequalities and premature deaths (Bartley et al., 2006; WHO, 2010). Over the past two decades the social determinants of health phenomena has been of great interest among public

health specialists and researchers as their primary concern has been to investigate factors other than medical care or clinical services that can be influenced by social policies and therefore play a pivotal role in influencing the health outcomes among individuals (Braveman and Gottlieb, 2014). Social determinants of health have been generally defined as "the conditions in which people are born, grow, live, work and age" and "the fundamental drivers of these conditions" (Braveman and Gottlieb, 2014). The global concern on health challenges has been fixated on gross health inequalities within and between countries, all these culminately impact on life expectancy and quality of life lived by individuals (Marmot, 2005).

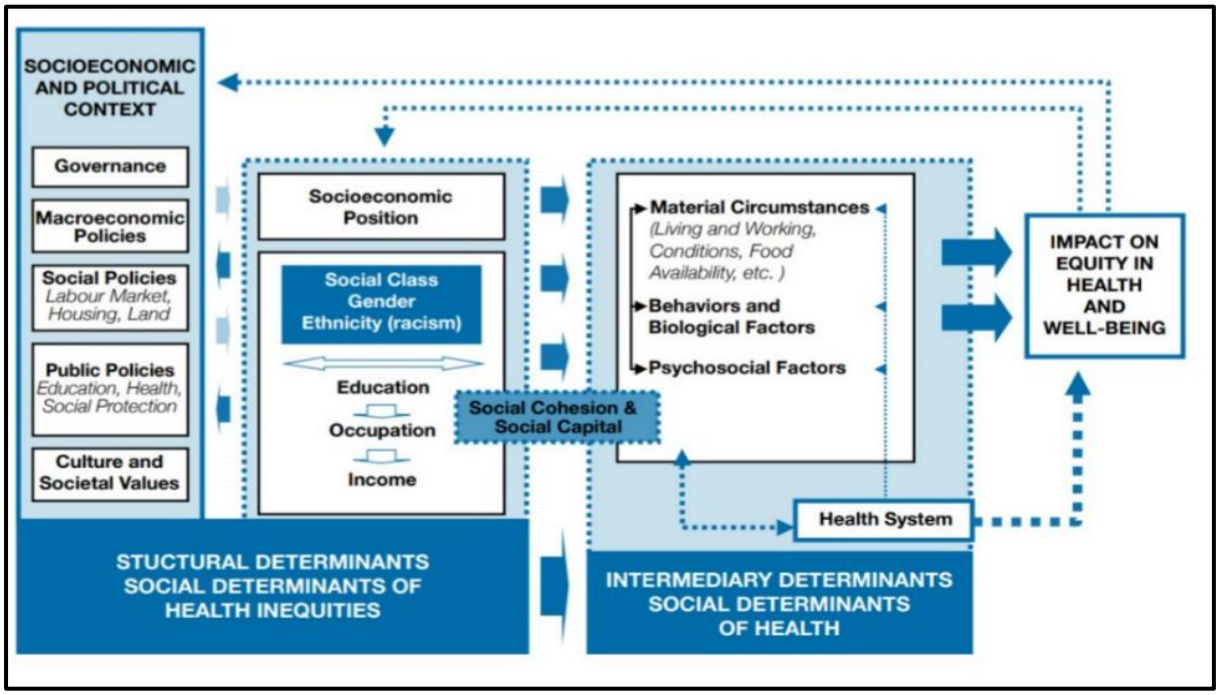

Figure 1: Theoretical framework - Social determinants of health
Source: (World Health Organization, 2010)

The social determinants of health framework emphasizes on social contexts considered to have an impact on health as well the pathways by which these social conditions consequently impact on health outcomes (Viner et al., 2012). Studies that have therefore assessed the cause of the causes using the social determinants of health framework and have therefore delineated the impact individual differences translate to population differences as well as the how social gradients and cultural factors affect health outcomes (Coovadia et al., 2009; Viner et al., 2012)

Conceptual Framework

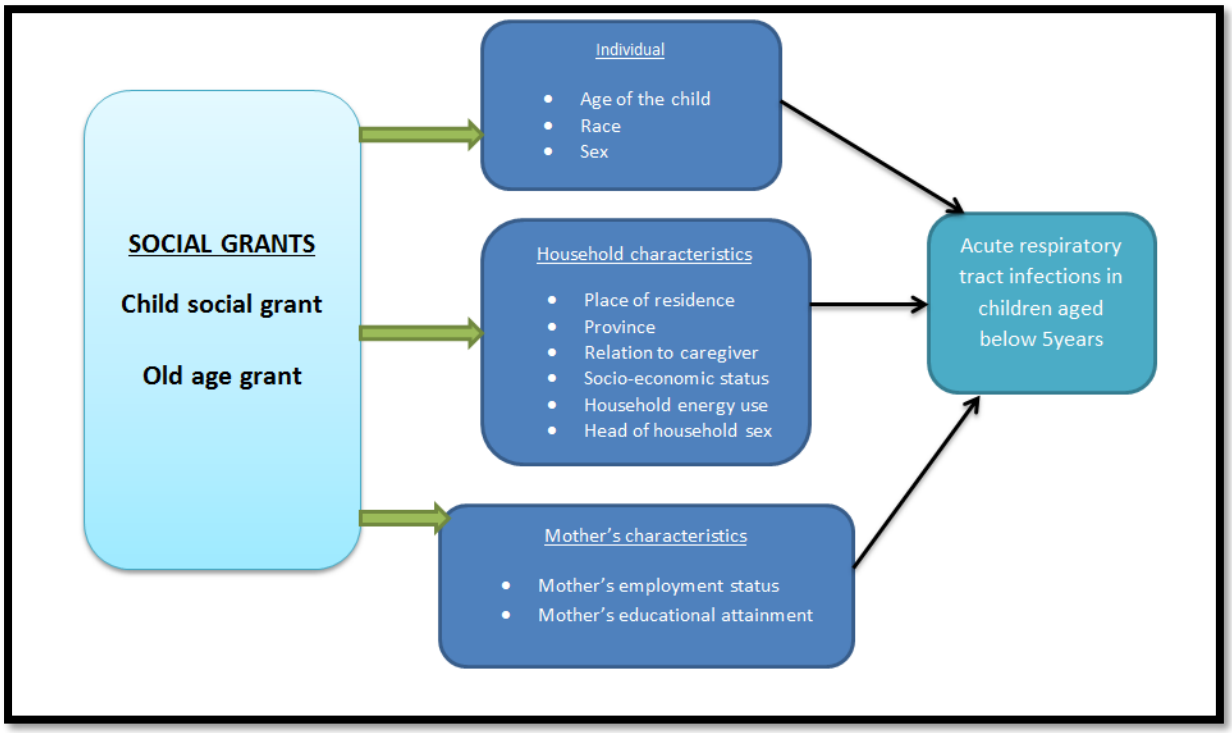

Figure 2: Conceptual Framework illustrating the relationship between social grants and health outcomes.

This study adapted the social determinants of health framework, the pathway of interest is the impact social policies in forms of social grants impact on the individual as well population differences, the social conditions therefore in play such as place of residence, socio-economic status and energy use will ultimately impact on health status of children by determining the levels of ARTIs in under 5children. A burgeoning volume of studies have extensively investigated the role of social factors in influencing health outcomes (Braveman and Gottlieb, 2014; Marmot, 2005). Results from these all inclusively allude to the point there is an inverse association between social circumstances and health outcomes; social covariates such as income, wealth, education all play a pivotal role in influencing disparities on health outcomes among children (Currie, 2009; Braveman and Gottlieb, 2014; Marmot, 2005). In the South African context collision of communicable and non-communicable epidemics is deeply entrenched in policies of the country's history from the colonial era, apartheid era trickling down to the post-apartheid era. Other factors that have had a contributory effect on health inequality in South Africa include racial and gender discrimination, migrant labour system,

distraction of family life, vast income inequalities and extreme violence. (Coovadia et al., 2009; Mayosi et al., 2012). The aim of the grant is to rather give a protection on the social aspect rather than give economic protection (Devereux and Sabates-Wheeler, 2004). Having adopted this framework, the desired goal of social assistance is to positively impact on diseases in the vulnerable group such as respiratory tract infections which have been observed to affect the poor compared to those with higher socioeconomic status (Mashita, 2014). Indicators related to socio-economic status like type of place of residence and household energy source have been observed to explain differentials in contraction of respiratory tract infections (Mashita, 2014)

Hypotheses

Assessing from the framework above the following hypotheses will be tested:

H_0 (Null): Social grants do not reduce the risk of respiratory tract infections in children.

H_1 (Alternative): Social grants reduce the risk of respiratory tract infections in children.

Significance level: $\alpha = 0.05$

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes and discusses methodological approach explored to respond to each of the research questions raised as well as to meet the objectives of this study. This includes a description of the study design, data source, study population, sample size and an outline of the independent and dependent variables. The process of data management is explained including the analysis of data.

3.2 Data

This study analysed data from the 2016 General Household Survey (GHS). The GHS is an annual household survey conducted by Statistics South Africa (Stats SA) targeting all private households in all nine provinces of South Africa and residents in workers' hostels (Stats SA, 2016). The GHS uses a Master Sample (MS) frame as a general-purpose sampling frame based on information collected during the 2011 Census conducted by Stats SA. The country was divided into 103 576 enumeration areas (EAs). The census EAs, were used as the frame units or building blocks for the formation of primary sampling units (PSUs) for the Master Sample. There are 3 324 primary sampling units (PSUs) in the Master Sample, with an expected sample of approximately 33 000 dwelling units (DUs). The Master Sample is designed to be representative at provincial level and within provinces at metro/non-metro levels. Within the metros, the sample is further distributed by geographical type into three geography types; Urban, Tribal and Farms. The sample for the GHS is based on a stratified two-stage design with probability proportional to size (PPS) sampling of PSUs in the first stage, and sampling of dwelling units (DUs) with systematic sampling in the second stage. After allocating the sample to the provinces, the sample was further stratified by geography (primary stratification), and by population attributes using Census 2011 data (secondary stratification). Just like any other household survey, the GHS2016 targeted only non-institutionalised and non-military persons in South Africa (Stats SA, 2016).

3.3 Study population and sample

The study population for this research comprised all children in South Africa aged between zero and 5 years in 2016. According to Stats SA (2016), there were 5, 862, 896 children aged -04 years in South Africa enumerated in 2016. In the GHS2016, a total of 7,185 children aged below 5 years from a nationally-representative sample of households were enumerated (Stats SÁ, 2016). The final sample used in this study out of the total population was 7156 children

aged below 5years. Data about children were collected from guardians or parents of the children, the sample in GHS is based on a stratified two-stage design with probability proportional to size (PPS) sampling of Primary Sampling Units (PSUs) in the first stage, and sampling of dwelling units (DUs) with systematic sampling in the second stage.

3.3 Variables

3.3.1 Dependent variable

The outcome variable in this study was ARTI. This variable was derived from parents or guardians' interview responses about a child's ARTI status. In the GHS2016, data about ARTI status were recoded as Q23FLU. The survey instrument of the GHS2016 collected data on ARTI using the following question;

"In the past three months, did (member of household) suffer from flu/acute respiratory tract infections?"

The responses were categorised as 0 (no) for no acute respiratory tract infections and 1(yes) for ARTIs among the children aged below 5years as reported by the guardian or the caregiver.

3.3.2 Independent Variables

Table 1 below shows the variables that were used in the study, as informed by literature and conceptual framework the following variables are included in the study;

Table 1: Variable description and definitions

Variables	Definition	Categorisation
Main independent variables		
Social Grant	Financial assistance provided by the government to a person for a specific purpose	1. Old age
		2. Child Social grant
Control variables		
Place of residence	The dwelling place where one resides	1. Rural
		2. Urban
Age of the child	Number of completed years at last birthday of the child	1. 1 year
		2. 2 years

		3. 3 years
		4. 4 years
Province	Administrative division of country	1.Western Cape
		2. Eastern Cape
		3. Northern Cape
		4. Free state
		5. Kwa-Zulu Natal
		6. North West
		7. Gauteng
		8. Mpumalanga
		9. Limpopo
Race	Population group	1 African
		2. Coloured
		3. Indian/Asian
		4. White
Sex	Child's gender	1. Male
		2. Female
Relation to main care giver	Relation of care giver to the child	1. Parent
		2. Grandparent
		3. Sister/brother
		4. Relatives
		5. Paid nanny
Socio-economic status	Measure of household expenditure	1. poor
		2. middle
		3. rich
Household energy source	Type of source of energy for cooking	1. Clean
		2. Unclean
Mothers employment status	Occupational status of the mother	1. Employed

		2. Unemployed
Mothers educational status	The highest level of education attainment of the mother	1. No education
		2. Primary
		3. Secondary
		4. Tertiary
Head of household sex	Sex of house hold	Male
		Female

The independent variables used in the study are tabulated above, the main independent variable of the study was social grants, this referred to the financial assistance provided by the government to a person for a specific purpose, in total 8 grants there are 8 social grants in South Africa, but in relation to the children in South Africa 2 grants (old age and child support) were relevant to the study as the other grants had no observations. Social variable was therefore categorised into old age, child support grant, care dependency, disability and foster child grant. The place of residence variable referred to dwelling place an individual resides, initially it was divide into 2 categories- (1) for urban settlements and (2) rural residents.

The age of a child as reported on GHS referred to the number of completed years at last birthday of the child, this variable was a continuous variable, in this study the age limit was from 0-4 years. South Africa has 9 provinces as used in the study, these are administrative divisions of country namely 1) Western Cape 2) Eastern Cape 3) Northern Cape 4) Free state 5) Kwa Zulu Natal 6) North West 7) Gauteng 8) Mpumalanga and Limpopo.

The race variable referred to the population groups in South Africa these were Black, coloured, Asians and Whites. The measure of household expenditure where the child resides was captured as SES which was categorised into poor middle and rich. The main energy used for cooking was recoded and categorised into clean and unclean energy.

The variables that pertained to the mother of the child and were utilised in this study were mothers' educational attainment and employment status. These were derived from merging the mothers file onto the child file. Age of the household head was a continuous variable.

3.5 Statistical analysis plan

The statistical plan for the study comprised three main parts. The first part was univariate analysis. The second part examined bivariate associates between the outcome variable and each of the independent variables. The third part explored multivariate models aimed at determining net effects of the independent variables on ARTI. This component of data analysis comprised exploring logistic regression and application of a threefold regression-based decomposition technique in a multivariate framework. The following sections describe each of the three components of the analytical plan.

3.5.1 Univariate analysis

The univariate analysis entailed obtaining distributions of the study sample according to background characteristics of children. Frequencies and percentage distributions were computed using appropriate weighting factors of the GHS2016. Univariate analysis also sought to determine the distribution of ARTIs among the children as well as residence in a household that receives an identified grant.

3.5.2 Bivariate analysis

The second phase involved bivariate examination of ARTI and each of the independent variables. Bivariate analysis made use of weighted cross tabulations of the dependent variable and main independent variable as well as control variables. The bivariate relationships were tested for significance using the chi-square tests. The use of chi-square tests enabled the study to determine the strength of crude associations between the outcome and each independent variable.

3.5.3 Multivariate analysis

The multivariate analyses were conducted using binary logistic regression and Blinder-Oaxaca decomposition.

3.5.3.1 Logistic regression

The choice of binary logistic regression model was based on the suitability of the model for analyzing and understanding a dichotomous response variable. The model was applied to assess the effect of social grants on respiratory tract infections among children aged below 5 years controlling for variables such as rural-urban residence, province, sex, age, co-residence with parents, socioeconomic status, type of place of residence and household energy source. The logistic model can be represented as follows;

$$\log \frac{\pi_i}{1-\pi_i} = log0_i = \alpha + \beta_1(X_1) \ldots \beta_k(X_k) \quad [1]$$

Where:

β1=Regression coefficient

$X_1 \ldots X_k$ =Independent variables

X_1= Independent variable

The model depicted in equation [1] produces coefficients. To estimate odds ratios for depicting the risk of having a respiratory tract infection associated with a predictor variable, conversion of the predicted natural log was implemented through exponentiating the regression parameters. The logistic model which was executed using Stata statistical software package took the following format;

$$\frac{\pi}{1-\pi} = e^{\alpha}\left(e^{\beta}\right)^{x} \quad [2]$$

3.5.3.2 Decomposition analysis

To decompose a binary outcome variable (ARTIs), the study employed the Blinder-Oaxaca decomposition technique. Multivariate decomposition approach is applicable to many demographic outcomes, which is especially useful for models that are nonlinear in parameters such as binary response, event count, and hazard rate models (Powers et al., 2011). This technique is used to quantify the contributions to group difference in average predictions from multivariate models (Bauer and Mathias, 2007; Powers et al., 2011). The decomposition technique in this study will give differences in ARTI levels among the two groups, that is the children residing in urban areas (group 1) and those in rural areas (group 2) and further quantify the contributory effect of each component to the observed ARTI differences. In the detailed results outputs of regression models are then utilised to partition the components to a group difference in a statistic into a component attributable to compositional differences between groups (endowments) and a component attributable to differences in the effects of characteristics (that is the difference in returns, coefficients or behavioural responses) and the interaction term (simultaneous existence in differences in endowments and coefficients) (Powers et al., 2011). Generally, the decomposition technique in this instance predicts the extent to which social grants explain differentials in ARTI

between children who live in households that receive grants and those from households that do not receive grants

By using the "oaxaca" command on Stata detailed decomposition and standard errors for both characteristic component and coefficient component for the logit model were provided (Powers et al., 2011), these quantified the role of different grants in explaining differences of ARTI's between children from houses that receive grants and those that are not grant recipients. Previous studies have also used the decomposition technique to predict the contributory effect of social grants on poverty levels and inequality among South Africans (Armstrong and Burger, 2009). The following formula was used in the study;

$$R = \{E(X_A) - E(X_B)\}' \beta_B + E(X_B)'(\beta_A - \beta_B) + \{E(X_A) - E(X_B)\}' (\beta_A - \beta_B) \quad [3]$$

Where R denotes difference and the first component $\{E(X_A) - E(X_B)\}' \beta_B$ represents the conditional contribution of group differences in characteristics; the second summation $E(X_B)'(\beta_A - \beta_B)$ computes conditional contribution to group differences of effects and the third component $\{E(X_A) - E(X_B)\}' (\beta_A - \beta_B)$ is an interaction term that measures the simultaneous existence in differences in endowments and coefficients between the two groups.

3.6 Limitations

The limitations of the study largely draw from the fact that analyses were based on cross sectional survey data which makes it impossible to determine causal effects. This study was not based on a case control design, limiting the extent to which all extraneous factors could be controlled. Furthermore, controlling was on household reception of grants and not necessarily use of the grants for child-related investments such as those aimed at limiting exposure to pollutants. It therefore follows the extent to which the sample was exposed to pollutants could not be definitively determined.

CHAPTER 4: RESULTS

4.1 Introduction

The goal of this research was to examine the effect of social grants on ARTI among children aged below 5 years in South Africa. This chapter presents results from data analysis and is organised into four main sections. Firstly, the univariate analysis entailed describing the background characteristics of children aged below the age of 5 years by using a series of frequency and percentage distributions for all variables included in the study. The bivariate analysis assessed general summary statistics and strength of association of ARTI with all measured covariates of the study using the chi-square test and cross tabulations. The multivariate stage was done using logistic regression to model the probability of occurrence of ARTI among children aged below 5years as well the multivariate decomposition which estimated the extent to which social grants contribute to the differences in ARTI's between children who reside in urban areas and those that reside in rural areas.

4.2 Distribution of the study sample

Table 2 below presents frequency and attendant percentage distribution of the study sample by place of residence and other predictor variables

Table 2: Demographic, socio-economic and spatial distribution of children aged below 5 years in South Africa 2016 [N=7,116]

Grants	**Frequency**	**Percentage**
No grant	733 362	14.67
Old age grant	1 007 718	20.15
Child social grant	3 259 647	65.18
Place of residence		
Urban	2 881 392	57.31
Rural	2 146 429	42.69
Province		
Western Cape	534 372 76	10.63

Eastern Cape	672 064 52	13.37
Northern Cape	111 119 159	2.21
Free State	228 428 57	4.54
KwaZulu-Natal	1 067 368	21.23
North West	383 118 41	7.62
Gauteng	988 805 97	19.67
Mpumalanga	429 111 74	8.53
Limpopo	613 431 79	12.20
Gender		
Male	2 486 410	49.45
Female	2 541 411 7	50.55
Relation to main person who takes care of the child		
parent	3 716 745	73.92
grandparent	857 778 58	17.06
sister/brother	50 887 838	1.01
relatives	293 747 06	5.84
Paid nanny	108 662 7	2.16
Household socio-economic status		
poor	1 533 539	30.50
middle	2 327 644 7	46.30
rich	1 166 638	23.20
Household energy use for cooking		
clean	3 861 977	76.81
Unclean	1 165 844	23.19
Mothers educational attainment		
No education	2 042 395	40.62

Primary	1 390 159	27.65
Secondary	1 513 774	30.11
Tertiary	81 493 129	1.62
Mothers employment status		
Employed	3 229 090	64.22
Not employed	1 798 731	35.78
Age of the child		
Less than 1 year	937 311 45	18.64
1 year	975 356 97	19.40
2 years	1 046 871 1	20.82
3 years	1 045 784	20.80
4 years	1 022 498	20.34
Population group		
African/Black	4 268 782	84.90
Colored	411 386 87	8.18
Indian/Asian	99 003 907	1.97
White	248 649 03	4.95
Sex of Household head		
Male	2 715 538	54.01
Female	2 312 283	45.99

Table 2 above shows the background characteristics of the children aged below 5years in South Africa. A greater percentage (65%) of the children aged below 5years were from households that receive the Child Social grant, 20 % were from households that receive Old age pensions grant. Furthermore, 15% of the children reside in households that do not receive any grant. The age of the child also indicates that the greatest proportion of the children are aged 3 years (21%) while the lowest percentage was recorded among children aged below 1 year.

The table also shows that by race, the greatest proportion of children aged below 5years were reported to be of black/African origin (85%), followed by Coloureds (8%) and the lowest percentage reported among the Indians/Asians (less than 2%).

Most of the children enumerated in the GHS2016 were from households found in urban areas. As shown in Table 2 above, 57% of the children were living in rural areas while 43% resided in rural areas. The highest percentage of children aged below 5 years were living in the Kwa Zulu Natal (21%) followed by Gauteng province which recorded 19% of children aged below 5 years and Eastern Cape with 13%. The Northern Cape and Free State provinces (less than 5%) accounted for the lowest percentage shares children aged below 5 years enumerated in the GHS2016. Across all remaining provinces the proportion of children aged below 5years approximated 10% respectively.

There was an almost similar number of males as females in the study sample. As shown in Table 2; 51% of the study sample was made up of females while 49% were males. This is an unexpected sex distribution for 0-4 year's age group given that the demographic studies have long established that male children constitute the majority of births compared to females. An estimated 74% of the children below the age of 5 years enumerated in the GHS2016 were mainly taken care of by their parents. A further 17% of the children had grandparents as main care givers. Less than 10% of the total sample were in the care of other relatives, sisters and paid nanny.

Table 2 also indicates that the highest percentage of the children (46%) aged below 5 years reside in houses of middle socio-economic status. A further 31% of the children aged below 5 years in South Africa are from household of poor socio-economic status, the lowest proportion (23%) of the children below the age of 5years are from households of rich socio-economic status.

Out of the total sample size, 77% were residing in households that relied on clean energy sources for cooking purposes. The other 23% were living in households that used unclean energy sources for cooking. An estimated 40% of the study sample were children of mothers who had less than primary education and 30% were of the mothers who completed primary education only. As shown in Table 2, 28% was made up of children whose mothers completed secondary education while only 2% had mothers who attained tertiary education.

The study sample was made of 64% of children whose mothers were working. The other 36% were children whose mothers reported that they were not working. Also shown in Table 2, an estimated 54% of the study sample were residing in households headed by a male. Meanwhile, 46% of the children were residing in female-headed households.

4.3 Univariate results

Univariate results show level of ARTIs among children aged below 5 years, figure 2 below presents percentage distribution ARTI among children.

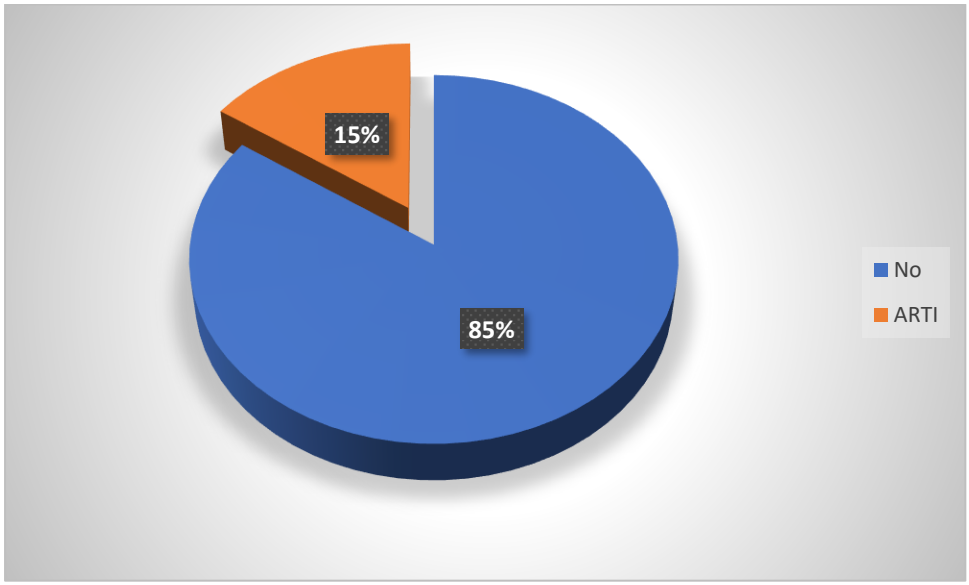

Figure 3: Showing percentage distribution of ARTIs among children aged below 5years

As shown if fig 2 above 15% of the children aged below 5 years had ARTIs, and larger majority 85% were reported to having no ARTIs.

4.4 Bivariate analysis

Table 3: Bivariate associations between predictor variables and existence of ARTIs for [N=7,116]

Variables	***n (% with ARTI)***	***n (% with no ARTI)***	**P value.**	X^2
Place of residence				
Urban	701 (18.07)	3 179 (81.93)	0.000	54.454
Rural	385 (11.89)	2 851 (88.11)		

Age of the child				
Less than 1 year	177 (13.35)	1 149 (86.65)	0.000	23.923
1 year	254 (18.25)	1 138 (81.75)		
2 years	253 (17.23)	1 215 (82.77)		
3 years	196 (13.15)	1 295 (86.85)		
4 years	206 (14.32)	1 233 (85.68)		
Social Grant				
No grant	122 (12.21)	877(87.79)		
Old age grant	249 (20.48)	967 (79.52)	0.000	34.474
Child social grant	715 (14.59)	4 186 (85.41)		
Province				
Western Cape	66 (11.19)	524 (88.81)		
Eastern Cape	143 (14.02)	877 (85.98)		
Northern Cape	47 (14.03)	288 (85.97)		
Free State	65 (16.46)	330 (83.54)		
KwaZulu-Natal	149 (12.03)	1 090 (87.97)	0.000	84.234
North West	64 (12.75)	438 (87.25)		
Gauteng	309 (22.36)	1 073 (77.64)		
Mpumalanga	122 (17.63)	570 (82.37)		
Limpopo	121 (11.23)	840 (87.41)		
Population group				
African/Black	973 (15.60)	5 263 (84.40)	0.010	11.451
Coloured	64 (10.67)	536 (89.33)		
Indian/Asian	12 (17.14)	58 (82.86)		
White	37 (17.62)	173 (82.38)		
Gender				

Male	532 (14.94)	3029 (84.42)	0.450	0.570
Female	554 (15.58)	3 001 (84.28)		
Relation of the main person who takes care of the child				
Parent	824 (16.25)	4 248 (83.75)	0.000	21.189
Grandparent	160 (11.41)	1 242 (88.59)		
Sister/brother	14 (18.42)	62 (81.58)		
Relatives	62 (14.80)	357 (85.20)		
Paid nanny	26 (17.69)	121 (82.31)		
Socio-economic status				
Poor	325 (14.31)	1 946 (85.69)	0.000	5.243
Middle	505 (15.12)	2 836 (84.88)		
Rich	256 (17.02)	1 248 (82.98)		
Energy source				
Clean	873 (16.18)	4 521 (83.82)	0.000	14.692
Unclean	213 (12.37)	1 509 (87.63)		
Mothers educational attainment				
No education	410 (14.45)	2 427 (85.55)	0.000	57.771
Primary education	255 (11.94)	1 880 (88.06)		
Secondary education	384 (19.12)	1 624 (80.88)		
Tertiary education	37 (27.21)	99 (72.79)		
Mothers employment status				
Employed	720 (15.98)	3,786 (84.02)	0.027	4.888
Unemployed	366 (14.02)	2,244 (85.98)		
Head of household sex				
Male	552 (15.90)	2,920 (84.10)	0.145	2.1289

Female	534 (14.65)	3,110 (85.35)

There lowest percentages of reported incidences of ARTIs among the group of children from households that were not receiving any grant. Among this group, 12% were reported to have had episodes of ARTIs. This is compared to 15% of the group of children who were residing in households with at least one member receiving a child social grant. While the highest proportion of ARTI's was reported among children residing in households that receive the old age grant (20%) Chi-square test examining the strength of association between grant status and ARTIs revealed the existence of a strong relationship ($p<0.05$).

By age, the highest percentage of reported ARTI incidences was among children aged 1 year, these attributed to a total of 18%. The lowest proportion of reported acute respiratory tract infections is lowest among children aged below 1 year and those aged 3 years, these attributed to a total of 13% each respectively. Generally, the proportion of cases gradually increases with age and peaks between the ages 1 to 2years.

The table further indicates that by race the highest percentages of ARTI were recorded among Indian (17%) and whites (18%), while Africans/blacks recorded 16% of ARTIs. The lowest percentage was recorded among coloured children (11%).

A greater percentage of children aged below the age of 5 years who were reported to have suffered from ARTIs where from urban settlements. As shown in Table 3, 18% of the children residing in urban areas had experienced ARTIs. This is compared to 12% of children from rural households who were reported to have suffered from ARTIs. The association between place of residence and ARTI was statistically significant (x^2 54.45; $p<0.05$). Therefore, based on this finding, the study rejected the null hypothesis that there rural-urban residence was not associated with experience of ARTIs.

The highest percentage of ARTI incidents (22%) among children aged below 5 years was reported in the Gauteng province. This was followed by Mpumalanga province (17%) and Free state (16%). For each of the other provinces, the reported incidence of ARTI among children aged below 5 years was below 14% with Western Cape province (11%) recording the lowest percentage of the children reported to have suffered from ARTIs. The association between ARTIs and province of residence proved to be statistically significant (x^2 84.23; $p<0.05$).

By relation to main caregiver, the highest percentage of ARTI incidence was recorded among children were the main caregiver was a sibling (sister/brother) or paid nanny, in this instance the proportion was 18% and 17% respectively. 16% of the children who were mainly taken care of by their parents reported an incidence of ARTI, while the lowest proportion was recorded among those were the grandparents were the main caregivers.

The highest percentage of reported ARTI in children aged below 5 years was from households of rich socio-economic status (17%), these were followed by the middle socio-economic status (15%) and the poor socioeconomic had the lowest proportion of ARTI incidence. The association was not statistically insignificant (x^2 5.24; $p < 0.05$).

The highest proportion of ARTI was reported in households that use clean sources of energy for cooking (16%) as compared to 12% who use unclean sources of energy for cooking. The association was statistically significant (x2 14.62; $p < 0.05$). This counter-intuitive finding can be interpreted as indicative of the importance of other variables that may be associated with household energy source. For instance, clean energy sources are normally afforded by households that have higher socio-economic status and have more educated adults compared to those that use unclean sources. This translate to knowledge and capacity to seek medical services for seemingly trivial ailments like colds and flu whereby households using clean sources of energy are more likely to consult health services providers for their children. Consequently, this disparity may result in health conditions such as ARTIs appearing as if they are concentrated among children from wealthier households that use clean energy sources compared to their counterparts using unclean sources.

In general, reporting of ARTI incidences of children increases with increase in attainment of mother's educational qualification. The highest proportion of ARTIs among children aged below 5years were reported among children whose mothers had attained tertiary education (27%), this is followed by attainment of secondary education by the mothers, the proportion of reporting ARTI cases gradually decreases and the lowest proportion reported among primary educated mothers 12%.

The highest proportion of children aged below 5years who reported an ARTI incident were from mothers that are employed (16%) as compared to those mothers that are not employed

that reported ARTI in 14% of their children. The association proved to be statistically significant (x^2 4.89; p-value <0.05).

4.5 Multivariate results

The study conducted multivariate logistic regression to examine the net effect of social grants on respiratory tract infections. Results from multivariate logistic regression analysis are presented in Table 4 below

Table 4: Logistic results

Variable	Odds Ratio	95% Confidence Interval	
Social grant			
No grant*(R.C)*			
Old age grant	1.5268***	1.1817	1.9727
Child support grant	1.2921***	1.0399	1.6057
Age of the child			
Less than 1 year (R.C)			
1 year	1.4584***	1.1776	1.8062
2 years	1.3649***	1.1014	1.6915
3 years	0.9220	0.6602	1.2876
4 years	1.0923	0.7877	1.5531
Province			
Western Cape(RC)			
Eastern Cape	1.4796***	1.0433	2.0734
Northern Cape	1.5128***	1.0049	2.2773
Free State	1.5166***	0.9985	2.3036
KwaZulu-Natal	1.1452	0.7889	1.6625
North West	1.1377	0.7468	1.7331
Gauteng	1.8623***	1.3622	2.5419
Mpumalanga	1.9234***	1.3389	2.7634

Limpopo	1.4319***	0.9914	2.0685
Race			
African/ Black(RC)			
Colored	0.6506***	0.4754	0.8904
Indian/Asian	0.8261	0.4333	1.5748
White	0.8353	0.5279	1.2593
Place of residence			
Rural (RC)			
Urban	1.4721***	1.2320	1.7589
Gender			
Female (RC)			
Male	0.9369	0.8143	1.0779
Relation to care giver			
Parent(RC)			
Grandparent	0.8578	0.6885	1.0687
Sister/brother	1.3864	0.7393	2.5999
Relatives	0.9949	0.7133	1.3877
Paid nanny	0.8721	0.5364	1.4179
Socio economic status			
Poor (RC)			
Middle	0.9844	0.8334	1.1629
Rich	1.1523	0.9349	1.4202
Household energy use			
Clean (RC)			
unclean	0.9154	0.7583	1.1052
Mothers educational status			

No education (RC)			
Primary	0.8741	0.6891	1.0285
Secondary	1.2676***	1.0740	1.4961
Tertiary	1.7776***	1.1455	2.7582
Mothers employment status			
Employed (RC)			
Unemployed	1.0882	0.7807	1.5167
Head of household sex			
Male (RC)			
Female	1.0251	0.8800	1.1941

*** Significant at p< 0.05 RC- Reference category

Table 4 shows that controlling for other variables; reception of a grant relative to non-reception of a grant was associated with higher likelihood of ARTIs. Both the old age grant and child support grant were associated with greater odds of ARTIs with statistical significance. As shown in Table 4, reception of an old age grant was associated with 53% (OR 1.53; CI 1.18-1.97) greater likelihood of a child experiencing an ARTI compared to non-reception of the grant. Meanwhile, living in a household that receives the child social grant increased children's risk of experiencing an ARTI by 29% (OR 1.29; CI 1.04-1.61).

Results on the age of child showed significance at the at the age of 1 year and 2 years, controlling for other variables a child aged 1 year has a 46% higher likelihood of ARTI in comparison to a child aged below 1 year (OR 1.46; CI 1.18 – 1.81). Furthermore, attaining the age of 2 years relative to less than 1 year statistically significantly increases the odds of ARTIs by 36%. (OR 1.36; CI 1.10 – 1.69). The results further show that at ages of 3 and 4 years there is a nonsignificant association, a child aged 3 years has a lesser likelihood of ARTIs (OR 0.92; CI 0.66 – 1.29). A child aged 4 years on the other hand has an almost equal odds of ARTIs (OR 1.09; CI 0.78 – 1.55).

Results showed that there is a statistically significant association between place of residence and ARTIs for children aged below 5 years. Controlling for other variables, a child residing

in an urban setting had a 47% higher probability of having ARTI incidence compared to a counterpart residing in a rural place (OR 1.47; CI 1.23-1.76).

Results on provinces proved to be statistically significant in all provinces except for North West and Kwa Zulu Natal. In Gauteng (OR 1.86; CI 1.36-2.54) and Mpumalanga (OR 1.92; CI 1.36-2.54) relative to being in Western Cape results depict a higher likelihood of ARTI incidences reported among children aged below 5years by over 80%. Results for Eastern Cape (OR 1.47 CI 1.04-2.07) and Northern Cape (OR 1.51 CI 1.00-2.28) show that there was almost 50% higher likelihood of ARTI. With regards to children residing in Limpopo (OR 1.43; *CI 0*.99-2.10) and Free State (OR 1.51; CI 0.98- 2.15) relative to those residing in Western Cape, the probability of having ARTIs was also higher. Meanwhile, residing in Kwa Zulu Natal and North West increased odds of ARTI and this association was not statistical significant.

Having controlled for other variables, mother's educational attainment status showed significance at attainment of tertiary and secondary education as children with mothers who have a tertiary qualification have statistically significant higher odds (OR 1.78; CI 1.46 – 2.75) of ARTI in comparison those with mothers who have no educational qualification at all. Attainment of secondary education by the mother statistically increases the odds of reporting ARTI by 27% with reference to those with no education.

4.6 Decomposition results

4.6.1 Sample distribution by residence status

Figure 4 below presents the distribution of the study sample by grant status.

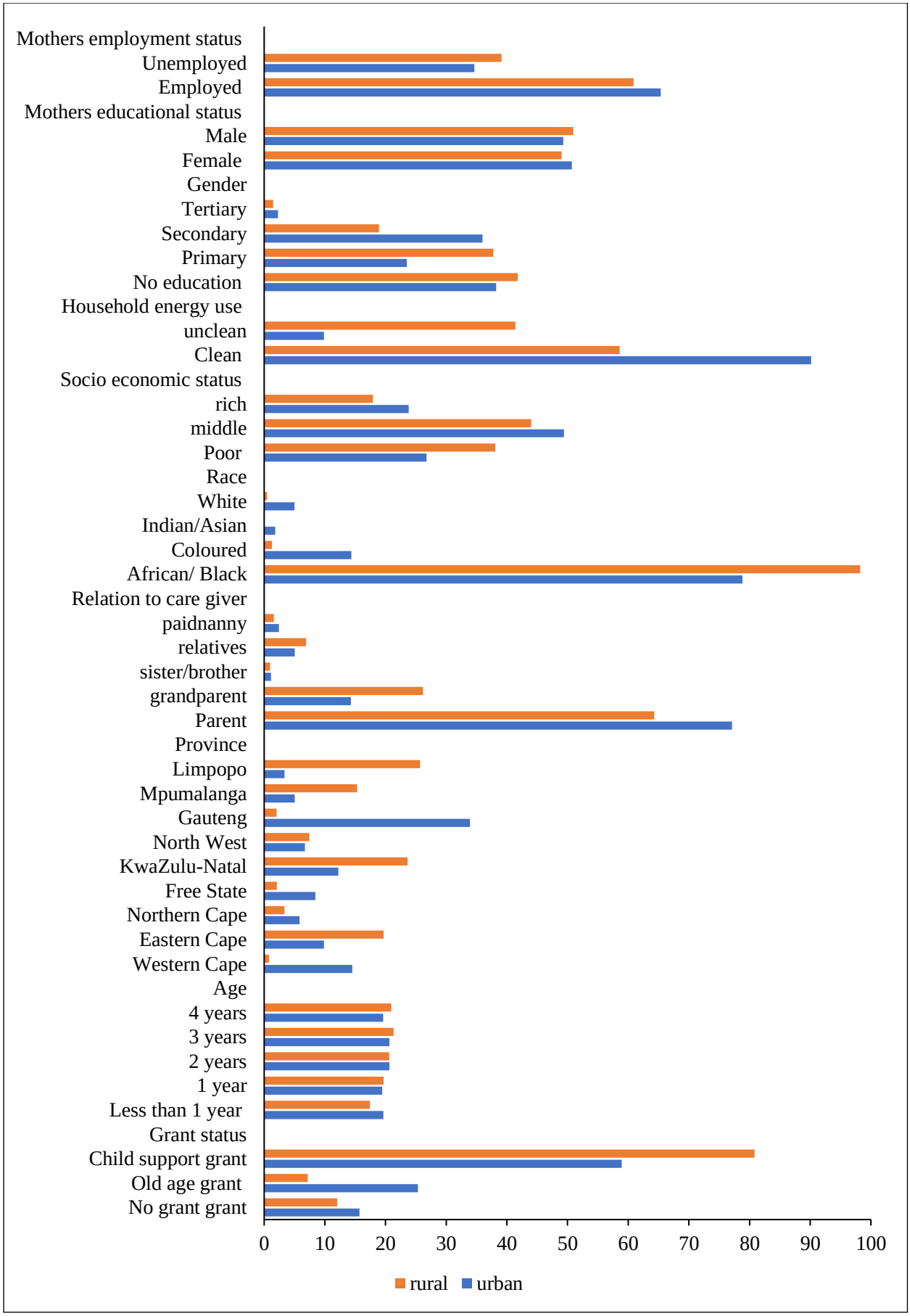
Mothers employment status
Unemployed
Employed
Mothers educational status
Male
Female
Gender
Tertiary
Secondary
Primary
No education
Household energy use
unclean
Clean
Socio economic status
rich
middle
Poor
Race
White
Indian/Asian
Coloured
African/ Black
Relation to care giver
paidnanny
relatives
sister/brother
grandparent
Parent
Province
Limpopo
Mpumalanga
Gauteng
North West
KwaZulu-Natal
Free State
Northern Cape
Eastern Cape
Western Cape
Age
4 years
3 years
2 years
1 year
Less than 1 year
Grant status
Child support grant
Old age grant
No grant grant
0
10
20
30
40
50
60
70
80
90
100
rural
urban

Figure 4: Distributions of the groups used in decomposition model

The figure above shows the compositional differences between the group of children residing in urban households and those from rural households. There were notable disparities between the two groups' compositional characteristics. For instance in urban areas the highest percentage of children receive child support grant (58%), while in rural areas though also the highest percentage receive child support grant the percentage is higher (81%). Differentials by age were almost equal among all age groups all ranging at around 20% by place of residence. In the less than 1 year age the highest percentage was in the urban areas (20%) while in the rural areas there were only 17%. The lowest percentage of children residing in households with old age grants were in rural areas (7%), in comparison to those in urban areas who accounted for a total of 25%. Compositional differences were also noted by province, whereby the highest proportion of children aged below the age of 5years lived in Gauteng (33%) and the lowest proportion in urban dwellers of children aged below 5 years (3%) resides in Limpopo. Provinces with the highest percentage of children aged below 5 years residing in rural area are Limpopo (26%) and Kwa Zulu Natal (24%). The compositional differences depicted in Figure 4 have a bearing on levels of ARTIs between the two groups of children, something which regression analysis alone would not be sufficient to estimate.

Table 5: Logistic regression results by place of residence [N=7,116]

	Group 1 (urban areas)			**Group 2 (rural areas)**		
Variable	**Coef.**	**95% CI**		**Coef.**	**95% CI**	
Social grant						
Old age grant	0.5287*	0.2212	0.8362	-0.0214	-0.5896	0.5468
Child support grant	0.3229*	0.0462	0.5996	0.1255	-0.2355	0.4865
Age of the child						
Less than 1 year (R.C)						
1 year	0.4094*	0.1416	0.6772	0.3920*	0.0270	0.7571
2 years	0.2810*	0.0116	0.5504	0.3932*	0.0295	0.7568
3 years	0.0057	-0.3857	0.3971	-0.3741	-1.0619	0.3138

4 years	0.1193	-0.2860	0.5246	-0.0980	-0.7785	0.5825
Western Cape(RC)						
Eastern Cape	0.5609*	0.1866	0.9352	1.6643	-0.5653	3.8939
Northern Cape	0.6164*	0.1769	1.0558	1.0244	-1.2267	3.2755
Free State	-0.0580	-0.4904	0.3744	3.1105*	0.8394	5.3816
KwaZulu-Natal	-0.2858	-0.6972	0.1255	1.9097	-0.3153	4.1347
North West	0.1074	-0.3366	0.5514	1.5088	-0.7462	3.7638
Gauteng	0.5527*	0.2372	0.8682	1.2603	-1.1358	3.6564
Mpumalanga	0.9088*	0.4806	1.3370	1.9210	-0.3105	4.1525
Limpopo	-0.3104	-0.9267	0.3059	1.9773	-0.2505	4.2051
Relation to care giver						
Parent(RC)						
grandparent	-0.0651	-0.3426	0.2124	-0.3533	-0.6658	-0.0407
sister/brother	0.1951	-0.5622	0.9524	0.2674	-0.7132	1.2480
relatives	0.3019	-0.0787	0.6825	-0.1755	-0.6660	0.3151
Paid nanny	0.0499	-0.4624	0.5622	-0.5554	-1.6037	0.4929
Race						
African/ Black(RC)						
Colored	-0.5914*	-0.9209	-0.2618	0.5833	-0.6578	1.8243
Indian/Asian	-0.1083	-0.7634	0.5467			
White	-0.3510	-0.7619	0.0599	0.8898	-0.4945	2.2741
Socio economic status						
Poor (RC)						
middle	-0.0110	-0.2204	0.1984	-0.0030	-0.2504	0.2444
rich	0.2290	-0.0238	0.4818	-0.0396	-0.3629	0.2836
Household energy use						

Clean (RC)						
unclean	-0.0630	-0.3523	0.2263	-0.1707	-0.4022	0.0609
Mothers educational status						
No education (RC)						
Primary	-0.0328	-0.2809	0.2153	-0.2197	-0.5074	0.0679
Secondary	0.3187*	0.1133	0.5242	0.1009	-0.1932	0.3949
Tertiary	0.7693*	0.2358	1.3028	0.3190	-0.4868	1.1248
Gender						
Female (RC)						
Male	-0.0436	-0.2116	0.1244	-0.0194	-0.2360	0.1972
Mothers employment status						
Employed (RC)						
Unemployed	0.0702	-0.2811	0.4215	0.4205	-0.2134	1.0545

* p<0.05, Coef. = Coefficients, CI = Confidence Interval

Results from the table 5 above show that in the urban areas reception of an old age grant relative to non-reception of a grant increases the probability of ARTI by 0.53 (CI 0.22 – 0.83), while the difference in the log odds of ARTI between receiving a child social grant and not receiving any grant was 0.32 (CI 0.05 – 0.60).

Attainment of the age 1 year and 2 years amongst the children significantly increased the probability of ARTI in both urban and rural areas. In urban areas, a one unit increase in age from zero to one year was associated with 0.41unit increase in the risk of ARTI. the difference in the log odds of ARTI between children aged 1 year age and those aged below 1 year was 0.41 (CI 0.14 – 0.68) and 0.39 unit increase (CI 0.02 – 0.76) in rural areas. In urban areas, attainment of 2 years among children increased the probability of ARTI by 0.28 (CI 0.01 – 0.55) while in rural areas among the same age group it increased the probability of ARTI by 0.39 (CI 0.02 – 0.76).

Results by province showed that residing in Eastern Cape relative to living in Western Cape significantly increased the odds of ARTI by 0.56 (CI 0.18 – 0.93) among children staying in urban areas. Residing in Northern Cape further increased the probability of ARTI

significantly by 0.62 (CI 0.17 – 1.05) and by 0.55 in Gauteng (CI 0.24 – 0.87). The difference in log odds of ARTI between living in Mpumalanga and Western Cape was 0.91 (CI 0.48 – 1.33). In the rural areas Free State is the only province that showed significant results relative to Western Cape. The magnitude of increase in the log odds of having ARTI for children living in Free State was 3.11 (CI 0.84 – 5.38) greater than for those living in Western Cape.

Results by race showed significance among the coloured race only in the urban areas, results show that the difference in log odds of ARTI between coloured children and African children was 0.59 (CI -0.92 - -0.26). Having a mother with secondary education and tertiary education significantly increases the probability of ARTI in urban areas by 0.31 (CI 0.11 – 0.52) among the secondary educated mothers and by 0.76 (CI 0.23 – 1.30) among mothers with tertiary education.

4.6.2 Aggregate results.

Table 5 below presents aggregate results from decomposition analysis. The table shows levels of ARTIs for each group, the difference between the groups and the conditional contributions of group differences in endowments, coefficients and an interaction term.

Table 6: Aggregate results from decomposition analysis for N=7,116

	Coefficients	**Conditional contribution (%)**
Urban (group 1)	0.1807*	
Rural (group 2	0.1190*	
Difference	0.0617*	
Endowments	-0.0035	-5.62856
Coefficients	0.0406*	65.81048
Interaction	0.0246	39.81808

Note: * indicates p< 0.05

The results shown in the table above indicate the proportion of children with ARTI is 0.18 in urban areas and 0.12 in rural areas and these proportions can be turned into 18% for urban areas and 12 % in rural areas respectively. The observed difference in levels of ARTIs between the two groups was equivalent to 6 percentage points. The positive coefficient for the difference reported in Table 5 indicates that there was a decrease in the level of ARTIs

from group 1 to group 2. This is because the decomposition model calculating the difference by subtracting ARTI level of rural group from that of urban group. The endowments provide a measure of the size of the gap between the two groups' levels of ARTIs that would be observed if the groups had similar coefficients and interaction and only differentiated by in characteristics only. This means that equalising returns to characteristics and interaction between the two groups, the level of ARTI in urban areas would have been greater than the observed difference by 6 percentage points as one moves from group 1 (urban) to group 2 (rural). Coefficients measure the extent to which the gap between the two groups if the only difference between them were the returns to characteristics. As shown in Table 5 above, allowing for differences in coefficients (effects) only would reduce the proportion with ARTIs in group 1 by 66 percentage points. The aggregate results in Table 5 however, do not reveal the role of social grants in explaining between-groups differentials in levels of ARTIs. This is revealed in the detailed results from the decomposition analysis which are presented in the section below.

4.6.3 Detailed decomposition results

Table 6 below shows detailed results from decomposition analysis.

Table 7: Detailed results from threefold decomposition analysis

Variable	**Endowments**		**Coefficients**		**Interaction**	
	Coefficients	Percentage	Coefficients	Percentage	Coefficients	Percentage
Social grant status						
No grant	-0.0000233	-0.03776576	-0.0040041*	-6.49004	-0.000633	-1.026
Old age grant	-0.0001855	-0.3006673	0.0028839*	4.674364	0.0037577	6.090661
Child support grant	-0.0003613	-0.58561238	0.005589**	9.05892	0.0007775	1.260209
Age						
Less than 1 year	-0.0000252	-0.04084537	-0.0023406	-3.79376	-0.0001524	-0.24702
1 year	-0.0000135	-0.02188145	-0.0021863	-3.54366	0.0000129	0.020909
2 years	1.95E-06	0.003160654	-0.0058587	-9.49606	-4.74E-06	-0.00768
3 years	0.0000539	0.087363707	0.0079622	12.90552	-0.0001301	-0.21087
4 years	0.0000391	0.063375157	0.0032723	5.303901	-0.0001073	-0.17392
Province						
Western Cape	-0.0039883	-6.46442806	0.0014661	2.376325	0.0128676	20.85642
Eastern Cape	-0.0001194	-0.19352925	0.0068824	11.15532	-0.001762	-2.85593

Northern Cape	-0.0002618	-0.42433801	0.0042692*	6.919724	0.0016508	2.675696
Free State	0.0017561	2.846371164	-0.004992*	-8.09127	-0.0079032	-12.8099
KwaZulu-Natal	-0.0006456	-1.04641947	-0.0262169*	-42.4936	0.0064819	10.50617
North West	0.0000116	0.018801837	-0.0003628	-0.58804	0.000018	0.029175
Gauteng	-0.0019538	-3.16681281	0.0017924	2.905208	0.0143859	23.31736
Mpumalanga	-0.0006047	-0.98012678	0.0072272	11.71419	-0.0024882	-4.03299
Limpopo	-0.0015424	-2.499996	-0.0316783*	-51.3457	0.014145	22.92689
Relation to care giver						
Parent	0.0003796	0.615273899	-0.0223266	-36.188	-0.0022785	-3.6931
Grandparent	0.0004119	0.667627289	0.0009983	1.618093	-0.0002333	-0.37814
sister/brother	0.0000114	0.018477667	-0.0004389	-0.71139	-0.0000331	-0.05365
Relatives	4.05E-06	0.006564434	0.0020049	3.249638	-0.0002749	-0.44557
Paid nanny	-0.00006	-0.09725088	0.0007424	1.203318	0.0001996	0.323521
Race						
African/ Black	0.0012985	2.104671122	0.0828334	134.2604	-0.0083997	-13.6146
Colored	0.0005114	0.828901665	-0.0009434*	-1.52911	-0.0048833	-7.91509
Indian/Asian	-0.0001208	-0.19579844	--	--	0.0006472	1.049013
White	0.0004272	0.692426264	-0.0004031	-0.65336	-0.0018862	-3.05724
Socio economic status						
Poor	-0.0000292	-0.04732876	-0.0044214	-7.16642	0.0006735	1.091641
Middle	0.000011	0.017829328	-0.0055798	-9.04401	-0.0003518	-0.57021
Rich	-0.0000272	-0.04408707	0.0043541*	7.057334	0.0007349	1.191161
Household energy use						
Clean	0.0004897	0.793729263	-0.0042165	-6.83431	-0.0011665	-1.89072
Unclean	0.0004897	0.793729263	0.00298	4.830127	-0.0011665	-1.89072
Mothers educational status						
No education	0.0000324	0.052515475	-0.0119485	-19.3667	0.0005229	0.847541
Primary	0.0007008	1.135890275	-0.0013565	-2.19868	0.0002634	0.426931
Secondary	0.0001577	0.255607729	0.0001039	0.168406	0.0000482	0.078125
Tertiary	0.0000384	0.062240563	0.000469	0.760178	0.0001274	0.206496
Gender						
Female	0.00000296	0.00479771	0.0007945	1.287764	0.000014	0.022692
Male	0.00000296	0.00479771	-0.0008256	-1.33817	0.000014	0.022692

Mothers employment status						
Employed	-0.0001714	-0.27781335	0.0142568	23.10811	0.0005392	0.873961
Unemployed	-0.0001714	-0.27781335	-0.009162	-14.8502	0.0005392	0.873961

Note * indicates p< 0.05; ** indicates p<0.1; * indicates p<0.15 N= 7,116

This table shows detailed results of the endowments, coefficients and interaction it shows that most of the characteristics had less than 0.1 conditional contribution., Most of the individual contribution is coming from the Western Cape (6%), by grant status results also show that if all covariates and effects were held constant and there change in child support grant, the resultant difference would be an increase in ARTI by 0.59%.

Results on the return to risks and behavioural responses (Coefficients) showed an overall conditional effect of 66% decrease in ARTI increase in ARTI and these proved to be statistically significant. Detailed results from the table above show that allowing for change among children that do not have grant, would result in net effect of 6 % increase in ARTI (p<0.15), however if all variables were to be held constant and change would be only in the old age grant, this would result in a conditional 5 percentage point decrease in ARTIs (p<0.15). Furthermore allowing change in the coefficients of the child support grant would further contribute to a decrease in ARTI by 9%.

Differences by provinces proved to have important contribution on group variability in levels of ARTI. Allowing for differences in coefficients for children residing in Northern Cape only while holding all constant all other coefficients and characteristics would significantly decrease ARTI by 7%. The other provinces where conditional contributions from differentials in coefficients were Frees Sate (8%) KwaZulu Natal (42%) and Limpopo (51%).

The study also observed significant differentials were observed among the coloured (p<0.05). Allowing change in the behavioural responses or return to risks among the coloured increased ARTI by 1%, while change by socio-economic status among the rich would also decrease ARTI among children by further 7%.

CHAPTER 5: DISCUSSION OF RESULTS AND CONCLUSION TO THE STUDY

5.1 Discussion

This chapter discusses the findings of the study with reference to existing literature, the theoretical framework and the objectives of the study. The main aim of the study was to examine the extent to which social grants are associated with children's health outcomes in South Africa with focus on ARTIs. To achieve this, three specific objectives were addressed. The first objective was to describe the levels of ARTIs among children aged below 5 years in South Africa. The second objective pertained to the examination of the net effect of social grants on respiratory tract infections. The third objective was to estimate the extent to which social grants could explain the differences in levels of ARTIs between children who received grants and those that did not receive grant

The aim of this study was to investigate the extent to which social grants in are associated with ARTIs among children aged below 5 years in South Africa. To achieve this aim, different specific objectives were set. The first specific objective of the study was to estimate the levels of ARTIs among children aged below 5 years in South Africa. The study observed that 15% of the total number of children aged below 5 years who were enumerated in the South African GHS2016 were reported to have had ARTIs. Results on the two groups (urban and rural) further showed that the highest prevalence was reported in the urban areas (18%) in comparison to rural areas (12%). Overall findings on the sample in this study are lower in comparison to other studies in other countries, for example, a cross sectional study conducted in Nigeria found that other cases of respiratory tract infections - pneumonia had a 31.6% prevalence and there were 6.9% reported cases of bronchitis (Ujunwa and Ezeonu, 2014). Meta-analysis of paediatric studies on ARTIs among children in the US found that the bacterial prevalence rate between 2000 and 2011 was 64.7% for the Acute otitis media and 20.2% for pharyngitis (Kronman et al., 2014). The results obtained in this study indicate lower prevalence of ARTIs compared to other studies. The study by Ujunwa and Ezeonu (2014) was hospital based and was prone to selection bias hence higher prevalence, the patients found in hospitals are already sick with compromised immune system hence likely to record higher incidences of RTIs.

The second specific objective of this study was to examine using multivariate logistic regression the probability and association between ARTIs and social grants controlling for

different sociodemographic and geographic variables. The logistic regression results therefore gave the impression that child social grant was associated with significantly higher odds of ARTIs compared to not receiving a grant. The results of the old age grant also depicted similar higher odds of ARTI in reference to non-reception of a grant. Logistic results on the two groups in the sample further showed that the significant higher probability of contracting ARTI among grant recipients was only significant among children residing in urban areas. Studies by Coetzee (2013) and DSD et al. (2012) appear to have contradictory results from this study.

The study by Coetzee (2013) established that cash transfers through the Child Social Grant had a positive effect on improving the health of children, nutrition and education. The study by DSD et al. (2012) found that recipients of the child support grant had less general illness compared to other children who were not on the grant. However, DSD et al. (2012) used a comparator of children in the same income bracket hence the results are a true and more reliable measure of the impact of the grant among the poor. Sample differentials in the studies account for the difference in results. This study however used a sample of all children aged between 0 to 5years within different income brackets. Further using the logistic regression on this one sample did not control for the huge disparities among the non-grant recipients who are rendered poor and the grant recipients who are in the majority of higher socioeconomic status. In the end the study included children households of all possible characteristics and comparison was made on all the extremes in SES. The differences in the sample composition may also have contributed to seemingly contradictory findings between the DSD et al. (2012), Coetzee (2013) study and the current endeavour. In light of the differences between current results and those found by DSD et al. (2012), there are reasons that can explain why this study found grant reception to be associated with greater odds of ARTIs.

The results from the logistic regression can be interpreted as depicting the behavioural characteristics or the returns that are associated the with the measured covariates. The old age/child grant recipients are enrolled on the basis meeting a below minimum threshold. This impoverished status quo is attached with returns of a low socioeconomic status. The living conditions of the poor in South Africa are concentrated in the peri-urban/informal settlements where the use of biomass (unclean) energy is high and indoor air pollution is rampant. The then observed low 'SES-Gradient' is accompanied with worse health outcomes which therefore increase ARTIs.

The cash transfers issued are not restrictive or conditional; the grant is viewed as source of household income and is spread out to cater for the household basics and at times rather lavish and selfish lifestyles. In the case of misuse of income from grants, the beneficiaries are sometimes deprived of healthier and nutritious diet which further compromise their immune system and leave the children more susceptible to bacterial infections and higher incidence of ARTIs.

The characteristics of the grant recipients that could impact are that grant recipients are often less educated and more likely to be unemployed. The consequent returns attached to these are compromised health seeking behaviour due to lack of resources and attendant poor health outcomes. Furthermore, grants do not necessarily eliminate inequalities in living conditions. Although they improve the living conditions of the poor, social grants are still not sufficient to enable the less privileged equal health benefits as the middle class. As a result, investigating the effects of social grants on ARTIs using a sample of all children irrespective of social class may give the impression that social grants do not improve health outcomes. This did not however handicap the current study because decomposition analysis enabled the study to quantify the positive effects of social grants on ARTIs for children in South Africa.

The old age grant was observed to have a statistically significant positive association with ARTI in under 5-year olds. A study conducted by Duflo (2000) found that the Old Age pension in South Africa impacted positively on the health and nutrition of children. The study by Duflo (2000) was also based on children aged zero to 4 years but the outcome variables were different from ARTIs. In the study, Duflo (2000) examined health and nutrition outcomes which were derived from the z-scores calculated from height and weight of the children. This is a more robust means of calculating health of children. As mentioned earlier on, the results of this study are depictive of the characteristics and measured covariates that attribute to the high levels of ATRI in comparison to the whole composition of the sample. Basically the grant recipients have almost similar characteristics and environments that influence health outcomes and in particular ARTIs. Self-reporting on the other hand has its demerits which include reporting errors and recall errors which might lead to over reporting of an incidence.

Logistic results in urban areas in this study were also indicative of a significantly higher probability of reported ARTIs in urban settlements compared to rural settlement. Though a study conducted by Eberhardt and Pamuk (2004) found that general health outcomes of rural residents are worse off in comparison to the urban counterparts. Other studies specific to ARTIs have found similar findings with this study with regards to place of residence. Gebertsadik et al., (2015) and Ujunwa and Ezeonu (2014) found that urban settlements had the highest number of ARTI cases as compared to the rural settlements. In Iraq a similar study on ARTI by Yousif and Khalek (2006) also found that the highest number ARTIs were concentrated in the rural neighbourhoods. Similarly, the South African urban context has been reported to have multiple risk factors of ARTI especially among children. Mashita (2014) and Gebertsadik et al (2015) found that in urban areas high incidence of ARTIs are as result of high levels of indoor air pollution. Peri-urban settlements and informal settlements have high use of unclean fuels in poor ventilated homes (Vanker et al., 2018). It is therefore evident that environmental surroundings play a significant role in determining ARTIs among children. It can also be noted that urban settlements are also located in proximity to health facilities and dwellers are mostly reached and thus aware of health promotion campaigns, such increased knowledge and exposure consequently affects the reporting of ARTI.

Results from the logistic regression also observed a positive association between reported ARTI and socioeconomic status among the rich households. Studies have however presented results stating that health outcomes among the rich in society are better in comparison to the poor (Berkman et al., 2014; Cohen et al., 2015; Currie and Stabile, 2003; Gebertsadik et al., 2015). Health seeking behaviours play an crucial role in reporting on disease, they are viewed as a reflection of family's disposition to make use of medical services, obtain and consume them (Pillai et al., 2003). Since the outcome ARTIs was a reported measure, the results are reflective of health seeking behaviour and affordability issues for consultation in health facilities hence ARTIs are reported to be 3 times higher among the rich relative to the poor where they can be dismissed as 'not hospital worthy'. The characteristics of the rich have associated living standards. Individuals from rich households have a more luxurious lifestyle, more educated adults and access to forms of media (internet, Facebook and twitter) that play an informative role on health issues. These factors altogether translate to knowledge and capacity to seek medical services for seemingly trivial ailments like colds and flu.

Mother's educational attainment showed statistical significant results on ARTI among children aged below the age of 5 years, results from logistic regression are indicative of an almost two times higher probability of reporting of ARTI cases among children aged below the age of 5 years, among secondary and tertiary qualified mothers relative to those with no education. A study on ARTI that had similar results of educational attainment likely increasing the odds acute upper respiratory tract infections among children of well-educated mothers, and the plausible explanation was that their greater health seeking behaviours (Ujunwa and Ezeonu, 2014). The returns to educational attainment past secondary education include a higher socioeconomic status and employability this ultimately impacts on the health seeking behaviour and reporting of ARTI. The results of primary education in comparison to the no education showed no statistical significance. This scenario also alludes to health seeking behaviour and attitudes towards ARTIs.

Results on provinces were in comparison of Western Cape as reference category. Coovadia et al., (2009) highlighted that according to the year 2000's statistics mortality of rates of children were almost 3times higher in Kwa-Zulu Natal compared to Cape Town. Cape Town region has been observed to have low poverty levels and better quality in health service delivery, this then means that in comparison to other regions results were bound to have worse outcomes to the comparator (Cape Town) which is the standard and an epitome of health care in South Africa. Also, regions with statistical significant higher odds of ARTI were Limpopo, Free State and Eastern Cape – these are regions noted for the highest poverty rates. The plausible explanation in this instance is the socioeconomic gradient which highlights that deprivation is associated with poorer health outcomes. However, urban settlements as Gauteng and Mpumalanga had the highest odds of reported ARTIs. These urban settlements as stated by Vanker et al., (2018) have high levels of biomass due to rise of peri-urban and informal settlements. Levels of indoor air pollution and living arrangements all rounded further exacerbate ARTIs in children aged below 5 years.

Results on the association of the age of a child and ARTI are consistent with similar studies conducted on ARTI among children (Gebertsadik et al., 2015; Ujunwa and Ezeonu, 2014; Yousif and Khaleq, 2006).

Logistic results on the whole sample showed significant higher odds among children aged 2 years (OR 1.36) and 1 year old (OR 1.46), the logistic on the rural and urban residents also echoed the same results among the same age group as well. All these point to the fact that

despite residential status children in the age group 1 year and 2 years old have higher probability of contracting ARTI. Similar results have been obtained in other studies, for example Gebertsadik et al., (2015) in a cross-sectional study based in Ethiopia found higher odds of ARTI among children aged 6-23 months (the first 2 years of their childhood). Similarly, in South Nigeria Ujunwa and Ezeuno (2014) found higher incidences of RTIs were observed among children in the first 20 months of their childhood. Furthermore, a longitudinal study based in Iraq also ascertained that 62% of the respiratory infections occurred in the first year of childhood. In the first 2 years of childhood, children have immature bronchioles and weakened immune system which renders them susceptible to diseases, as they grow older and stronger the immune system improves in resisting infections hence the probability of contracting infections gradually decreases with increase in age.

There are differences in results of the logistic regression and decomposition analysis. In the logistic the whole sample was treated as one and distinguished on the outcome variable (ARTIs). This is the main reason why a decomposition analysis was necessary in order to investigate the extent to which social grants impact ARTIs as it approximates an experimental design by disaggregating two groups for comparison purposes.

The aggregate results reflect that endowments account for 6 percentage points conditional change in levels of ARTI, if children residing in urban areas were to be assigned characteristics of rural residents ARTI would have a marked increase. These measured variables in the study are reflective of the inequality status in South African context thereby consequently through the returns impacting on the health outcome (ARTIs). Seekings and Nattrass, (2005) observed that even if de-racialisation of policy was implemented, it did not reach a desired effect in reducing inequality. Instead, it has rather given rise to social classes in society based on ownership, skills and employment and the 'insiders' lavishing in the better part of it all. These classes in society have observable patterns and characteristics as a group, the privileged are predisposed to better health outcomes, affordability is a non-issue. Lower socio-economic status on the other hand is correlated with increased risks of nearly every major causes of death, infections and the effect is worse off among the children (Gebertsadik et al., 2015; Cohen et al., 2010; Currie and Stabile, 2003). Race differentials have been observed also, with the Whites being associated with higher socioeconomic status and thus healthier outcomes in comparison to the other races.

Decomposition results among grant recipients are consistent with other studies as they indicate that cash transfers ameliorate worse health outcomes among children which the logistic regression failed to do (Coetzee, 2013; DSD et al., 2012; Duflo, 2000).

Those who live in households located in urban areas (group 1) were compared with those residing in rural households (group 2). Results on the coefficients (returns to risks) among those who do not receive grants showed that removing benefits and advantageous characteristics among this group would increase ARTIs among children by 6%. The non-reception of grant status is on the basis on belonging into a much higher income bracket.

This privileged status therefore acts as a protective measure against ARTIs. Those in the better SES are likely to have better living environments, cleaner sources of fuel, be better educated and afford quality health-care services. These returns therefore play a pivotal role in determining ARTIs hence controlling for these has observable outcomes of increasing ARTIs. Studies that have measured covariates that a SES related such as pollution, socioeconomic status and region concluded that these were associated to respiratory health of children (Gauderman et al., 2002; Mashita, 2014; Smith et al., 2000).

Results show that among measured characteristics in this study, a statistical significant contribution in ARTI is from returns to risk of the Old Age grant and Child Support grant. If all variables and effects were held constant, and change was affected on the child social grant there would be a significant 75% decrease in ARTIs. Grants to an extent enable households to seek health services for their children (Wakadha et al., 2013), the use of grants includes purchasing of food thereby improving food accessibility and availability (Gutura and Tang, 2014). Food intake improves nutrition thereby promoting general health as well as immunity among diseases. The results show that among the poor the cash transfer plays a major protective role against poor health outcomes measured as ARTIs.

Results on the old age grant show that if all variables and effects were held constant and change was in the old age grant there would be a significant 6% decrease in ARTIs. The old age grant plays a crucial role in influencing the health of children taking into cognisance that one third of the African children in South Africa live with a pension recipient. A study by Duflo (2000) found that the Old Age grant has led to improvements in health and nutrition among South Africa children, findings which are consistent with those observed from

decomposition analysis in this study. Overall, findings on grants show that cash transfer of any form despite its contribution and numbers on the total sample play a role in decreasing poor health outcomes among children. Child social grant and old age grant are the most common forms of state welfare hence they have a remarkable impact in comparison to all the grants.

5.3 Limitations

Statistical analysis in the study depicted an association between social and ARTIs, however the study falls short of presenting causation as it is a cross sectional study. The outcome variable- ARTIs were reported measures thus a clinical test would have increased relevance of the results. Data on the study was collected at one point in time, the prevalence of the study is limited to that snap shot and repeated episodes as well seasonal differentials of ARTIs were not presented in the study. Furthermore, the children were sampled at household level and not individual level thus it is only an assumption that the sample of the children receiving grants were truly nationally representative.

5.3 Conclusion

5.3.1 Summary of the study

This quantitative study examined the extent to which social grants are associated with children's health outcomes in South Africa with focus on ARTIs using data from the 2016 General Household Survey. The ARTI outcome variable was derived from parents or guardians' interview responses about a child's ARTI status. Chapter 1 introduced the study, providing the background to the research problem and the motivation for conducting the study. Chapter 2 reviewed existing related literature which largely implied that health outcomes have multiple factor that interplay together to determine the health of children. In chapter 3 the methodology of the study was discussed as well as the motivation for the methods which were used to analyse the data. Chapter 4 discussed results on odds of ARTIs as well as decomposition on results on ARTIs. This chapter has discussed the main findings of the study in light of the research questions and identified potential limitations of the study. It has also provided recommendations for the study as well as reasons for government and its stakeholders to take necessary responses to the observed results. A conclusion to the study is provide below

5.3.2 Conclusion of the study

This study established that the return to characteristics of social grants recipients has a potential effect of reducing ARTIs among the poor and those in urban settlements. While the statistical analysis cannot prove causation it however reflects consistency with the hypothesis that social grants decrease ARTIs in children aged below 5 years. Social grants therefore play a vital role in addressing health outcomes associated with poverty and the magnitude of these results is dependent on the coverage of grants among the poor in the society. Other studies have either looked at ARTI and its determinants, in the case of grant intervention measurement has been focused on poverty reduction, nutrition and health measured in height for weight scores and general illness. A gap in literature has therefore been to measure social protection against preventable diseases that are associated with impoverishment and poverty. By filling this gap, this study has added to the body of knowledge quantifying the extent to which government interventions such as cash transfers can reduce levels of ARTIs.

5.4 Recommendations

To further derive issues of causality since ARTIs can be caused by bacterial infections which can be prevented through health awareness campaigns, there is need for longitudinal studies that are clinical based. A mixed method approach can also be essential to understand the perceptions and attitudes of the poor towards ailments like tract infections that may be viewed as not serious health issues. This will provide a basis for designing intervention programmes aimed at improving the health seeking behaviours of the underprivileged. Furthermore, temporal observations of incidences of ARTIs can be incorporated in existing health and demographic surveillance programmes in South Africa. This will provide better quality data for the study of social determinants of ARTIs. Results of the study indicate that cash transfers are effective in addressing health outcomes, this consequently means wider and full coverage of the grants will yield even better health outcomes. Government initiatives could also take the form of conditional grants or packages to the poor children who might not be beneficiaries of the social grants as means to join the global agenda of alleviating poverty and achieving wellbeing of all children. To further strengthen RTIs program awareness government initiatives can integrate with NGOs so as to target informal settlements and high-density areas in urban residential areas.

As a signatory of the SDG agenda, South Africa is mandated to join the global community and further promote good health and wellbeing especially among children aged below 5 years. Further documentation of the extent and nature of these health disparities among grant

recipients is necessary for development of policies and programs designed to eliminate child poverty, morbidity and mortality as stated by the SDGs. To comprehensively achieve set targets and milestones, there is need to reduce infection and mortality caused by treatable diseases such as ARTIs that are associated with poverty.

5.5 References

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