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Effects of Allergic Rhinitis on Work Productivity: A Study of Nairobi Central Business District Health Clinics, Nairobi County, Kenya

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Definition of Key Terms

1) **Absenteeism:** Represents the number of days/hours missed from work due to illness.
2) **Allergic disease:** Disorder associated with unusual sensitivity to harmless substances that provoke a strong reaction from the body.
3) **Allergic rhinitis:** Is an allergen dependent inflammation of the nose. It may be acute or chronic recurrent or seasonal
4) **Amnesia:** Forgetfulness.
5) **Antigen/allergens:** Foreign substances usually proteins capable of stimulating immune response.
6) **Antihistamines:** Any drug that neutralizes the effects of histamines.
7) **Anti-inflammatory:** Any drug which acts to reduce inflammation.
8) **Cognitive functions:** Functions of the mind
9) **Herb:** Any of various usually aromatic plants that are used in medicine.
10) **Histamines:** An amine, formed from histamine, and released by the body tissues in allergic body reactions.
11) **Immune systems:** Organs responsible for immunity
12) **Insomnia:** Lack of sleep
13) **Lacrimation:** Secretion of tears
14) **Over counter medication:** medicines bought from a chemist that does not require a physician's prescription.
15) **Poor concentration:** inability to concentrate while performing assigned duties.
16) **Presenteeism:** Refers to illness-related reductions in performance while the person is at work.
17) **Rhinorrhoea:** Discharge from the nose
18) **Productivity:** This is basically an input-output relationship i.e. the relationship between the quantities of output produced in relation to the quality of input consumed.
19) **Work Productivity:** is the amount of goods and services that a worker produces in a given amount of time.

1. Executive Summary

Allergic rhinitis, also known as hay fever, is one of the most common allergic diseases in Kenya. It accounts for most visits to healthcare providers by employee adults resulting to lost productivity attributed to the disease as reported by National Institute of Allergy and Infectious Diseases,(2002); National Institutes of Health, (2002). The study was conducted in Nairobi County which is a major contributor to Kenya's economy. It generates over 45 per cent of GDP, employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2006).

The broad objective of this study was to establish the work productivity among employees with Allergic Rhinitis, in Nairobi Central Business District. The study had four specific objectives which included establishing characteristics of employees in relation to work productivity, their economic status, the health service factors related to employees seeking AR treatment that influences work productivity and knowledge, attitude and practice of employees with AR and its effect on work productivity. A total of 384 employees with Allergic rhinitis were recruited for this study. Both qualitative and quantitative methods were used to collect the data. Cluster and multi stage sampling was used to identify the respondents. Structured questionnaires were used to collect quantitative data from the employees, and key informant and focused group guides were used to collect the qualitative data.

Based on the key findings of this study it was established that employee's with AR, main source of income influenced their work productivity at 81%. Health service factors which included, seeking treatment, treatment given, availability of drugs, over the counter, waiting time at the health facility and number of revisits done at the health facility influenced work productivity at 80%. The Knowledge, attitude and practice of employees with AR had an influence on their work productivity. Knowledge on AR treatment, symptoms of side effects if AR medication and alternative (herbal) treatment of AR and compliance to the treatment given at the health facility influenced work productivity. All the above variables had a P value less than .05.

In conclusion, employees with allergic rhinitis had their work productivity increased with age. Main source of income of employees with allergic rhinitis had an influence on their work productivity. Knowledge attitude and practices of employees with allergic rhinitis, on the treatment of AR, symptoms of AR, side effects of AR medication has an influence on work productivity.

Based on the study finding the following recommendations were made regarding employee's knowledge on AR management is a major influence on work productivity. Since AR is a common cause of morbidity among workers. There is need for the employers to organize and conduct health talks on AR management in order improve employees coping mechanisms. There is need to conduct further

research, on the cost benefit analysis to quantify the lost work productivity, by employees with AR. This will give information to the employers and health workers, on the ideal treatment for AR patients so as to adapt a more effective treatment that will promote the employee level of productivity by reducing absenteeism.

2. Introduction and Background Information

2.1 Introduction

It is estimated that over 600 million people, from all countries, all ethnic groups, and all ages suffer from allergic rhinitis according to Weinburg (2001) and WHO (2002). In the world 20 % of the population, suffers from allergic diseases, and among them is allergic rhinitis. Bousquet (2006) reported that, the prevalence of allergic rhinitis in developing countries, is increasing faster than in developed countries. Relative prevalence rates of allergic rhinitis, in seven African states, show that South Africa has 20%, Kenya 15.8%, Nigeria 13%, Tunisia 11.9%, Morocco 10.4% and Ethiopia 9.1 % as indicated by Asher et al, (2006).

Allergic rhinitis is a major chronic respiratory disease due to its prevalence, impact on quality of life, impact on work performance and productivity. This may contribute to the economic burden to individuals and households as argued by Allergy, (2001). The bothersome nature, of these symptoms impairs ones' daily activities, quality of sleep, cognitive functions and work productivity Walker, (2007). It also has an impact, on the psychological wellbeing, of the individual Nihlen *et al (*2004). Treatment options include avoidance of the allergens causing the problem. Other forms of treatment include, use of antihistamines, nasal decongestants and corticosteroid sprays.

Drugs used for the treatment of allergic rhinitis, cause sedation, affecting the productivity of the affected staff. Allergic rhinitis, contributes to frequent attendance to health facilities by those affected. Allergic rhinitis usually begins in childhood, adolescence, or early adulthood, and often wanes, but may persist, with increasing age. Rhinitis is defined as inflammation of the membranes lining the nose WHO (2002). The functional impact of allergic rhinitis ranges from mild to seriously debilitating effects on social, physical, and emotional functioning, which may interfere with cognitive tasks, impair work performance, and cause work absences. Because allergic rhinitis is so common and allergens are ubiquitous, allergic rhinitis creates a significant burden in the workplace in terms of work performance and healthcare costs. Although exposures to airborne allergies present in the workplace can cause occupational rhinitis, non-occupational rhinitis represents a vastly greater burden in workplace settings overall Bolin et al, (2001).

2.2 Background information of Nairobi County

Location and physiographic features
Nairobi is located at the south-eastern end of Kenya's agricultural heartland, at approximately 1° 9'S, 1° 28'S and 36° 4'E, 37° 10'E. It occupies an area of about 696km2 (CBS 2001) and the altitude varies between 1,600 and 1,850 meters above sea level (Mitullah 2003). The western part of Nairobi is on high ground with rugged topography, the eastern side is generally low and flat. Key physical features include the Nairobi, Ngong and Mathare rivers and the indigenous Karura forest in northern Nairobi. The Ngong hills stand towards the west, Mount Kenya towards the north and Mount Kilimanjaro towards the south-east. As Nairobi is adjacent to the Rift Valley, minor earthquakes and tremors occasionally occur.

Demographic characteristics
The city's population by the 2009 census was 3.1 million and is projected to be 3.8 million by 2015 (CBS 2001). According to the United Nations Population Fund (UNFPA), human impact on the environment is a function of population size, per capita consumption and the environmental damage caused by the technology used to produce what is consumed (UNFPA 2001). The environmental consequences of population growth are amplified by the growth in numbers. Rapid increase in population has led to unprecedented sprawl of informal settlements; outstripped the city's delivery of social services (education, health care, water supply and sanitation); increased the motorization rate (both personal and public service vehicles) and attendant air pollution; and increased poverty levels within the city.

Population is a major driver of environmental change in Nairobi and as such is a determinant of other parameters such as solid-waste-generation rates, land-use patterns and settlement, and water consumption. This increase will put even more pressure on the available resources. Population growth is partly explained by net migration into the city as stated by NEMA (2003). The forces motivating rural-urban migration to Nairobi include better economic prospects, opportunities for higher education and higher wage employment, and the attraction of Nairobi as a market for goods and services. But there is also the phenomenon of diurnal migration of people from the environs who commute daily into Nairobi for purposes of employment, education or trade.

Education
Illiteracy rates in Nairobi for the 15–54 age group are 7.8 per cent for women and 5.8 per cent for men. Illiteracy levels are lowest in Nairobi, compared to the rest of the country: 21 per cent for women and 12 per cent for males. 56.4 per cent of women and 67.3 of men have attended secondary school and above, compared with 48.2 and 57.7 per centre respectively for urban areas in general in Kenya (CBS 2003a). Table 2.3 shows school attendance by 10-year age groups for Nairobi. The Government introduced free primary education in 2003. This was intended to broaden access to primary schooling especially among poor households. In all, 85 per cent of children of primary school age (6–13 years) are attending school.

Economic
Nairobi is major contributor to Kenya's economy. It generates over 45 per cent of GDP, employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2006). The lower income group constitutes about 80 per cent of the population in Nairobi. Inflation is a persistent cause of the rise in consumer prices or decline in

the purchasing power of money, caused by an increase in available currency and credit beyond the proportion of available goods and services

As Nairobi's population increases, so does the demand for jobs. Currently, 56.6 per cent of women and 68.6 per cent of men aged between 15 and 50 are economically active (CBS et al. 2004). Between 1989 and 1997, the combined formal and informal sector employment growth in Nairobi was 2.3 per cent per annum, less than half that of the rate of population growth (Post Buckley International Inc. 1998). It is estimated that about 500,000 people join the labour force annually. Most of these are unable to secure employment and thus remain unemployed or end up in traditional agriculture and in the informal sector (Odhiambo and Manda 2003). The labour force survey shows that 9% of people in Nairobi were employed and 24 % unemployed (CBS 2003b).

Nairobi commands the largest share of modern sector wage employment in Kenya, with a total of 453,000 people in 2005 (CBS 2006). The distribution of the labour force in wage employment was as follows: 83,100 were in manufacturing industry; 40,300 in construction; 64,700 in trade, restaurants, and hotels; 34,700 in transport and communications; 38,600 in finance, insurance, real estate and business services; while community, social, and personal services employed 168,100 people (CBS 2006). The main formal employment zones in Nairobi are the central business district and the industrial area, along Jogoo and Mombasa Road, Ruaraka and Thika Road and Dandora. Although there have been efforts to decentralize employment concentration from the central areas to satellite centres, the central business district and the central industrial area (Jogoo Mombasa Road) still remain the core employment zones. The economy and the environment are closely linked, as natural resources are the basis of production, manufacturing and waste disposal. Environmental resources such as forests, water and land have a vital role to play in boosting economic growth and reducing poverty. While it may be argued that economic growth brings many benefits to people, the attendant pollution loading and resource depletion poses great risks to human health and the environment. If not managed properly this may even jeopardize the viability of the economic activities being supported.

Health

Disease burden

Good health is a basic component of human well being and a necessity for earning a livelihood. .Available data show that the leading cause of death is respiratory ailments. Respiratory disease and Malaria accounted for over 50 per cent of all deaths in the city (CBS 2003d). The main health issues in Nairobi include access to health facilities, child and maternal mortality and the incidences of certain diseases such as HIV/ AIDS, tuberculosis and malaria, among others.

Most of these diseases are related to the state of the environment. The five most important causes of death in children under five include acute respiratory infection (ARI), diarrhoea, measles, malaria, malnutrition and anaemia. All these are related to the living environment poor sanitation and lack of safe drinking water. Other diseases like tuberculosis, typhoid, intestinal parasites, meningitis and tapeworm are all associated with the lack of safe drinking water. The prevalence of ARI and diarrhoeal disease in Nairobi was 16.4 and 13.9per cent (CBS, 2004).

Quality of housing

Almost 7 per cent (722,000) of the total housing units in Kenya are found in Nairobi (CBS 2002b). Most of these (67 per cent) are one-room dwelling units (CBS 2002b). In such conditions overcrowding particularly in poorly ventilated accommodation is a cause of environmental health problems. Thus, reports indicate that most single rooms in Mathare Valley and Korogocho have an occupancy rate of 6–8 people (Hayombe 1997).

Mobility and transport

Nairobi acts as the central point where journeys begin to destinations all round the country and is itself the country's primary destination. Transport in Nairobi can be divided into five categories: private vehicles, buses, Matatus (minibuses), commuter trains and taxis. Sometimes ignored, but equally important are the non-motorized forms of transport, such as walking and cycling. Dealing with urban mobility issues is an economic, social and environmental priority. The city's traffic jams, pollution and inadequate pedestrian facilities and cycle lanes represent a major setback to the productive capacity of the economy, affecting all segments of society (CBS 2003).

Water supply

Despite the fact that production exceeds demand, only about 187,000 (or 42 per cent) of households in Nairobi have proper water connections (MWI/WSP 2005). The poor state of the distribution system results in up to 50 per cent losses due to leakages and illegal connections (UNEP/ DRSRS undated). The urban poor and slum dwellers are the ones who suffer most from the lack of piped water supply. Water vendors, charge much more than the tariff, from the lack of piped water supply. Lack of access to water forces these communities to spend a large proportion of their income on water, leading to household poverty (CBS 2003).

Access to sanitation

Another area of concern in urban environmental infrastructure is the provision of sanitary facilities, especially refuse collection and sewage disposal. As the population increases, so does the amount of waste that needs to be managed. Pollution and waste management Water, air and land in Nairobi receive large quantities of pollutants with significant deleterious effect on their quality and on the quality of life in general. While the problems of water pollution in the city and inadequate municipal solid waste management are not visible to the naked eye, air pollution is not. The rapid growth of the number of vehicles and of commercial and industrial enterprises is generating enormous amounts of air pollutants. The terms "pollution" and "waste management" in this chapter refer to the pollution of water, air and land, and their management.

Problem statement

The prevalence of Allergic Rhinitis (AR) in developing countries including Kenya is increasing faster as reported by Bousquet (2006). Nairobi has a higher AR, though prevalence is not known. AR is not a life threatening condition, but greater emphasis is on the patient well being as an outcome measure. AR has major implication in terms of associated morbidity and cost. Compared to other urban centers in Kenya, Nairobi has the greatest concentration of industrial and vehicle air pollutant sources as indicated by Mulaku and Kariuki (2001). Wide range of pollutant gases and particulate matter influence the air quality and population health of workers in Nairobi. AR is related to environmental factors such as poor sanitation, waste management, access to water and air quality.

Nairobi is a major contributor to Kenya's economy and commands the largest share of modern sector wage employment in Kenya. It generates over 45 per cent of GDP, employs 25 per cent of Kenyans and 43 per cent of the country's urban workers (UN-Habitat 2006). The main formal employment zones in Nairobi are the Central Business District (CBD) and the industrial area. AR is preventable but could hold back development because of the economic loss of productivity of the people affected. Workforce productivity losses constitute a substantial component of AR costs of illness, ranging from 10 to 60% of the total costs per patient according to studies by Blaiss (2000).

Most studies on AR according to WHO (2002) concentrate on school going children or total populations. Walker (2007) argues that most of these studies center on the management and treatment of AR. This necessitates the study on AR on employees because its severity, results in absenteeism. Some drugs used for the treatment of allergic rhinitis cause sedation and this lower workers' productivity states Crystal *et al (*2000). Allergic rhinitis is a recurring condition resulting in the affected person making frequent visits to the clinic for treatment. Nairobi CBD being the main employment zone, there is need to establish the relationship between AR and work productivity loses in terms of work absenteeism.

The purpose of the study is to establish the effects of Allergic Rhinitis, among employees in the Nairobi Central Business District, and its effects on work productivity. Findings of the study will be used to make recommendations on policy and programmes, aimed at reducing the prevalence of this condition, and therefore improve the productivity of the affected staff.

Research questions

1) What are the employee characteristics, which are related to AR in Nairobi CBD?
2) What is the relationship between economic status of employee's AR and work productivity?
3) What are the health service factors that influence the outcome of AR in Nairobi CBD?
4) What is the knowledge, attitude and practice of employee on AR and its effect on work productivity?

Broad objective

Establish the effects of Allergic Rhinitis among formal employees with Allergic Rhinitis in Nairobi Central Business District.

Specific objectives

1) To describe the characteristic of employee's with AR, in relation to work productivity.
2) To establish the relationship between economic statuses of employee's with AR and work productivity.
3) To describe the correlation between health service factors of employees with AR, and work productivity.
4) To assess knowledge, attitude and practice of employees with AR and its effect on work productivity

Justification

Despite the recognition that Allergic Rhinitis is a global health problem and is increasing in prevalence as stated by Lundback (2000) many patients do not recognize allergic rhinitis as a disease and therefore do not consult for treatment. There is need to establish employees knowledge, attitude and practice on Allergic Rhinitis because it influences their productivity at work. It is estimated that 20% of the world population, suffers from AR (WHO 2002). Most studies on AR concentrate on school going children or total populations. Walker (2007) argues that most of the studies center on the management and treatment of AR. Only some studies focus on working population and the effects. This necessitates the study on AR on employees because of its severity results in absenteeism, as indicated by Crystal et al (2000).

Some drugs used for the treatment of allergic rhinitis cause sedation and this lower workers' productivity states Crystal *et al (*2000). Allergic rhinitis is a recurring condition resulting in the affected person making frequent visits to the clinic for treatment. Nairobi CBD being the main employment zone there is need to establish the relationship between AR and work productivity lose in terms of work absenteeism caused by AR.

3. Literature Review

Introduction

When an allergen, such as pollen or dust is inhaled by a person with a sensitized immune system, it triggers antibody reaction. These antibodies mostly bind to mast cells, which contain histamine. When the mast cells are stimulated by pollen and dust, histamine and other chemicals are released (WHO 2002).The nose is easily obstructed by the swelling of the lining mucus membrane. The interaction of the allergens with I.e., located on the mast cells in the mucus membrane results in the release of a variety of mediators which results in vasodilatation and inflammation, increased mucus secretion and cellular recruitment and increased capillary permeability characteristic of allergic rhinitis (Reference). These mediators also alter the balance in the nervous control of the nasal function, leading to direct effect on vasodilatation and hyper secretion .Continued exposure to the allergens alters nasal sensitivity to the extent that lesser quantities of the same allergens and nonspecific irritants, cause on going symptoms, the so called priming effect (Weinberg 2001).

Prevalence of Allergic Rhinitis

Epidemiological trend of Allergic Rhinitis

It is estimated that over 600 million people, from all countries, all ethnic groups, and all ages suffer from allergic rhinitis (Allergy 2008) and the World Health Organization 2002, estimated that 20% of the world population, suffers from allergic diseases, and among them is allergic rhinitis. According to Bousquet (2006), he reported that, the prevalence of allergic rhinitis in developing countries, is increasing faster than in developed countries. Relative prevalence rates, in seven African states, show that South Africa has 20%, Nigeria 13%, Tunisia 11.9%, morocco 10.4% and Ethiopia 9.1 % Mathias et al (2007).

Risk factors associated with AR

According to WHO (2000), risk factors include a family history of allergic rhinitis or hereditary and environmental exposures to indoor and outdoor allergens. Heredity and environmental exposures may contribute to a predisposition of allergies. According to Sheppard (2004) a bigger urban population's worldwide continues to develop allergies due to toxic environmental substances which are responsible for environmental associated illnesses affecting over 40 million people. Amato et al (2002) reported the link between the increase in the prevalence of allergic airway diseases and an increase in air pollution. According to Weinberg (2001) the condition may present at any age from infancy onwards but there appears to be an increased incidence in adolescents and young adults.

Bolin et al (2001) in their study on asthma and; the significance of chronic conditions for individual behavior found out that, there was significant decrease in the demand for health investment with age. The estimated marginal effect of an increase in the wage rate was positive for the demand for health while not significant for the number of days of work- absenteeism. This implies that the investment aspects of wealth capital out-weighed the consumption aspects; an increase in the wage rate would make health capital relatively more valuable and induce the individual to increase his or her stock of health capital.

Both smokers and former smokers were found to demand lower levels of health capital than those who had never smoked. However, smokers and former smokers were found to invest more in health than the general population. Men appeared to be healthier than women. The number of days of work-absenteeism was higher, however, if the respondent was a woman; in other words, women seemed to invest more in their health than men do. In the same study it was found that the family structure has some importance for individual health behavior because those married or cohabiting were found to be healthier than singles.

Trigger factors related to Allergic Rhinitis

According to Weinburg (2001) allergic Rhinitis reaction is triggered by grass pollen, tree pollen mould; animal dander; house dust mites, occupational allergens, food allergens, and other similar inhaled allergens. Nicolai et al (2003) in his study reported that high levels of vehicle emissions have been correlated with the increasing prevalence of respiratory allergies. Venet al (2001) in their study reported that use of modern fuels appears to increase the risk of allergic sensitization and could be a significant contributing factor in the increasing prevalence of allergic disorders. Some disorders may be associated with allergies; Co morbidities include asthma, depression, migraine and eczema.

Allergic Rhinitis Symptoms

According to Weinburg (2001), in the first season, the symptoms may be interpreted as the result of a prolonged cold, but eventually the seasonal nature of the condition will be recognized. Nasal itching, sneezing and prolonged watery discharge are troublesome. Another annoying symptom is an intense itching of the soft palate as well as itching in the auditory canals. Headaches and irritability are common as is a profuse post-nasal drip. Allergic conjunctivitis with itchy, watery eyes and photophobia usually accompany the nasal symptoms. Children with itchy palates often produce a clicking noise when they attempt to rid themselves of the itch with their tongue

Treatment of Allergic Rhinitis

According to Maran (1992) avoidance of the allergen is the optimum treatment. Unfortunately, and in particular, this is rarely possible totally with some animals and foodstuffs. Gentle reassuring advice may allow the patient to change his lifestyle minimally with great benefit. Nasal decongestants have limited place for local decongestant sprays and drops because of the well described rebound phenomenon. Oral antihistamines have been the mainstay of treatment; unfortunately their main side-effect is drowsiness. Some of the new generation antihistamines do not cause drowsiness. Other forms of treatment include hyposensitisation, sodium chromoglycate, and use of steroids. Surgical treatment is considered, when turbinate surgery is required, to technically unblock the nasal airways which have become chronically affected by the allergy.

Complications related to Allergic Rhinitis

According to Maran(1992),complications include hypertrophy of inferior turbinate, otitis media with effusion, nasal polyps, According to ARIA(2001) allergic rhinitis is a major chronic respiratory disease due to its prevalence, impact on quality of life, its impact on work/ school performance and productivity, its burden on the economy, and its link with asthma .Allergic rhinitis patients also suffer from, sleep disorders, emotional problems, impairment in daily activities and social functioning.

Employee's characteristics related to AR

The effects of allergy on individual behavior and quality of life

A study by Mesiak *et al*(2003) show that Allergy is the most important chronic childhood respiratory disease and is frequently confounded by the presence of allergic rhinitis. Clearly the symptoms of allergy are more than a nuisance. A survey, by Storms *et al* (1997), found that 40% of the allergy sufferers felt or strongly agreed that their symptoms interfered with their daily activities, while 82% reported that they usually have their symptoms at work or school. Allergic rhinitis sufferers say their illness affects their lives uniquely and most people don't realize the effects.

A study Harris, et al (1996), offers a more comprehensive picture, showing that lifestyle impact of allergic rhinitis is considerable. The survey had more than 1,000 adults with allergies; majority had rhinitis symptoms from pollen allergies, more than half said their symptoms interfered to some degree with sleeping, exercising and enjoying food. Nearly 47% reported that allergy symptoms hindered their ability to work, and approximately 1/5 said their sex lives were affected by symptoms of allergy. Walker et al (2007), in his study on seasonal allergic rhinitis, reported that, Allergic rhinitis sufferers also had chronic nasal congestion; running nose, resulting in a lot of discomfort, while at work.

Allergy inflicted suffering in a variety of ways, for those individuals who are affected by the disease. An individual, who suffers from allergy, may be forced to avoid or reduce allergic reaction, by avoiding social places, and spending a lot of time in the health care systems. Other activities such as working, studying or enjoying ones leisure time, are diminished. Furthermore, those suffering from allergy may experience reduction in income as they worked less, hence less income. Additionally not only the individual who suffered from allergy were affected but also that of individual's family, for example because the environment in the home may have to be adapted to the preconditions of the affected individual. Also for the society at large, there are significant health consequences, from allergies because it reduces the wellbeing of a substantial number of the population Al Frayh et al *(*2001).

A study by Blaiss (2004) on asthma and allergy prevalence and economic implications reported that, allergy not only caused significant personal suffering, but also have a substantial economic impact on society at large. The economic impact is felt as a result of indirect costs due to loss of productivity and direct costs as a result of outpatient clinics. A study by Lindegren (2000), noted that Individual behavior is the crucial determinant of the cost of illness and, understanding individual health related behavior is essential for instance policy making.

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Impact on sleep and daily activities

All steep disorders and complaints including insomnia, waking up during the night; snoring and feeling fatigued, when awake were common in house with allergic rhinitis, who also sleep more hours, took longer to fall asleep and more often felt sleepy during the day. Among 591 patients with allergic rhinitis 41.6 percent (vs. 18.3 %of those without allergic rhinitis) reported hardly falling asleep.63.2% said they felt they lacked adequate sleep (compared to25.4% of controls.) and 35.8% vs. 16% of controls reported insomnia. The results show a significant impact of allergic rhinitis on all dimensions of sleep quality, and consequently, a lower quality of life as reflected of more somnolence (sleepiness), daytime fatigue and sleepiness; and impaired memory, mood and sexuality, with significantly increased consumption of alcohol and sedative, in cases compared to control greed .The effects of AR on sleep; becomes more pronounced when the condition was moderate to severe. As allergies worsened individuals slept fewer hours of the night, felt sleepy more often during the day, took longer to fall asleep and found it more necessary to take sedative drugs JAMA (2006).

A study by Biaridini, et al,(2006),on" sleep disturbance on allergic diseases", states that sleep in which people spend approximately one third of their life, is essential ,for physical and mental health, as well as daytime performance .This constitutes a crucial aspect, of the personal representation, of the well-being. Sleep disturbance in patients with chronic disorders may acerbate symptoms, complicate management, affect mood, as well as quality of life.

Ledger et al, (2005), in their study, on an international survey of insomnia, stated that the prevalence of sleep disturbances is high: approximately 35% of adults experience transient or occasional difficulties sleeping, and 10-20% suffer from chronic sleep disturbances. This is probably an underestimate: due to individual adaptation and adjustment processes, many patients do not report their sleep problems to healthcare professionals. Although poor sleep is often accepted as "the norm", it has a detrimental impact, on daily functioning and quality of life, even in healthy people

Biaridini, et al,(2006), in their study, reported that sleep disturbances ,express themselves in daily life, making people more susceptible to cognitive impairment(memory, learning ability, concentration), functional problems(impaired psychomotor function and procedural skills, decrease in productivity, increased accidents) and psychological consequences,(fatigue, irritability, malaise, anxiety, depression) the effects in term of costs to society are also considerable. Associations between subjective complaints, of daytime sleepiness, inadequate sleep time, insomnia.

According to the Global initiative for Asthma, (2003), the causes of sleep disturbances in allergic diseases are numerous and also include those factors that are important to the general population such as insufficient or ineffective sleep, and inadequate sleep hygiene. Nevertheless, evidence suggests that allergy itself can disrupt sleep: the presence of troublesome symptoms, difficulty in obtaining optimal disease control, and contributing psychological reactions of a chronic condition(irritability, anxiety, depression) trigger a vicious cycle in which allergy interferes with sleep, and sleep has significant relapses on quality of life related to the disease

Kapur et al, (2002), defines insomnia as a persistent complaint of difficulty initiating sleep, difficulty maintaining sleep and non restorative sleep. These difficulties should cause daytime sleepiness with decreased daily functioning. Kapur *et al*, (2002), describes the term 'sleep-disordered breathing' as a large spectrum of abnormal respiration during sleep, ranging from primary snoring to obstructive sleep apnea (OSA).This result in poor sleep at night, this in turn results in poor concentration during the day causing presenteeism, day time sleepiness, tiredness, absenteeism hence reduced work performance.

Manocchia et al.(2001), in their study on sleep problems, health, related quality of life, and work functioning and health care utilization among chronically ill, found out that, patients with allergies, have sleep problems. Several dimensions were significantly affected, and these include

physical functioning, role physical limitations, social functioning, role emotional limitations, and mental problem

According to Weinberg (2001), patients suffering from AR, presents with itchy palates, often producing clicking noise, when they attempt to rid themselves of the itch in the palate using their tongue. Watery nasal discharge is quite troublesome in those patients with allergic rhinitis making them quite uncomfortable. Nasal obstruction may be associated with malaise, headaches, disturbed sleep and mouth breathing. The later leads to very dry lips, patients are often thirsty and may wake up at might to drink water resulting in disturbed sleep. Post nasal mucus drip is usually present. A common manifestation is the "allergic salute" where the nose is pushed upwards or sideways to try and clear the obstruction. This produces a characteristic transverse crease across the nose called allergic crease.

Relationship between employee's absenteeism and AR

Effects of allergic rhinitis on work impairment and productivity loss

Crystal et.al (2000), in his study found that, workers productivity is lowered by the condition itself, or by the medication the patient is taking. Many chronic illnesses that affect the working population can cause losses in productivity. In allergic rhinitis, the patient is put down, by nasal obstruction and runny nose, to the extent that it affects concentration in class, or at work. Severe cases ends up being given off duty, or results in absenteeism, which is a relatively concrete end point that can be observed.

A study, conducted by Demoly et al (2005), on 3042 patients consulting general practitioners for allergic rhinitis evaluated the impact of the disease on quality of life, sleep and work productivity. Patients were classified according to the four classes of acute respiratory infections, and compiled three questionnaires: the rhino conjunctivitis, quality of life questionnaire(QLQ), the Jenkins questionnaire for sleep problems, and work performance, as measured by the Allergy-Specific Work Productivity and Activity Impairment(WPAI-AS) questionnaire, that measures work performance and Sleep. Daily activities, and work productivity, were impaired in patients, placed in all four acute respiratory infections categories, and rhinitis severity was more important than duration.

Turner et al (1992) in their study, reported that, Complications relating to allergic rhinitis include chronic sinusitis, Otitis media (an infection of middle ear) which can lead to hearing loss, Patients with these conditions, end up being given long days, of off duty. In some mild cases patients end up reporting on duty and do not concentrate at all resulting in presenteeism and this leads to low productivity

A study done by Peters *et al* (2000), on the cost of productivity losses associated with allergic rhinitis showed that allergic rhinitis may cause absenteeism or reduced productivity while at work, when the condition is untreated. Pellegrino (1997), reported that as many as 75% of the workers with allergies are either absent from work or have reduced productivity at work for 2 or more weeks a year.

Effects of allergy medication on work productivity

Verster et al *(*2004), reported that major side effects of first generation antihistamines have traditionally been sedation, which occurs in as many as 10-50% of patients. The medications induce sleep, adversely affect awakening, reduce alertness, and prolong sleep. Such adverse effects can seriously, reduce cognitive function (sustained attention, reaction time, cerebral processing), and impair tasks where concentration and a high degree of alertness are required (i.e. driving performance, learning, work).

A study by Peters et al(2000), noted that, In the case of allergic rhinitis, workers productivity was lowered by its treatment with non prescription anti histamines referred to as sedating antihistamines. Employees on sedating anti histamines, experienced on average about 8% reduction in daily work out put, in the day following receipt of prescription. Employees who used non sedating anti histamines experience average of 5% increase in their daily work output in the same time period 13% net difference daily work output between users of non sedating antihistamine.

Meltzer (1996), in his study, on productivity costs of antihistamines in the workplace, reported that some antihistamines can reduce productivity in the employed population by causing sedation. Use of none sedating antihistamines in particular represent significant change in performance. Purchasers of health products including employers should consider the cost savings that result when worker productivity losses reduced savings that offset the cost of pharmaceutical treatment. Lijas et al (1998) reported that the cost of some classes of medications may be viewed as an investment in the improved health and productivity of the workers. Gilmore et al (1996) in one study found that, health plan members experienced a 50%increase in the job accidents when they were prescribed a sedating antihistamine within the 30 days before their accident.

In another study done by Peter's et al.(2000) on costs of productivity losses associated with allergic rhinitis they found out that those workers using sedating antihistamines reported that their productivity is diminished by an average of 25% or 14 work days per year. Allergy patients because of their condition, take over the counter medications, which make the sufferers even worse by causing drowsiness. Firemen, (1997), in his study reported that, those who take sedating medications, the results could be tragic; an example is a driver who falls asleep on the highway. This may end up, taking their life, and the lives of the others, in their own hands.

Health service factors that influence AR treatment

The effects of allergic rhinitis on health care utilization

Bolin et al (2002), in their study on asthma and allergy ,the significance of chronic conditions on individual behaviors, found out that both asthmatic and those who suffer from allergy invested more in their health than general population. The presence of asthma and allergy is predicted to lower the level of health, where as the effect of investments in health is indeterminate. People who suffer, from allergy and asthma will have higher rates of depreciation and hence have higher

net costs of health capital than those without chronic illnesses. This will increase the demand for health and their health levels. Moreover people, who suffer from asthma and allergy, may produce a smaller amount of gross health investment. If productivity is sufficiently low, the demand for gross health investment will increase, even though there is a decrease in the demand for health. If not the demand for gross health investment will decrease.

In the same study by Bolin et al. (2002), on chronic conditions, for individual behavior showed that, there was significant decrease in demand for health investment, with wage. The estimated marginal effect, of an increase in wage rate, was positive for demand for health while not significant for the number of days of work absenteeism. This implies, that the investment aspects of health capital, outweighed the consumption aspects, an increase in wage rate would make health capital relatively more valuable, and induce the individual to increase, his or her stock of health capital.

Apter et al (1999) in their study found out that men appeared to be healthier than women. However, the number of days of work absenteeism was higher if the respondent was a woman. This therefore meant women; invest more in their health, than men do. Health related quality of life, is therefore not only influenced by the severity of the disease but also by demographic and socio economic factor. Gep, (1976) in his study found that health care utilization is mainly through admissions, cost of pharmaceuticals, physician consultations and emergency outpatient attendance. Admission rate increase was noted to increase in the age group 0-3 years Gendo (2005) in his study found out that, high health care utilization rates, particularly for urgent visits, hospitalization, and emergency visits, can be decreased with appropriate management of the disease

Knowledge, attitude and practice of employee on AR

A study by Sangasapaviliya A, Pholsuwanchai K. (2008) to determine attitude and knowledge of patients with asthma and allergic rhinitis who received AIT (Allergen Immunotherapy). This was a cross-sectional descriptive study conducted in the patients with allergic asthma and allergic rhinitis in a hospital set up. The study concluded that patients treated with AIT had still lack of knowledge about AIT treatment and the potential serious side effect that could occur.

Another study done on self-care practice in patients with allergic rhinitis at Songklanagarind Hospital by Saraban L, et al (2004), whose purpose was to examine self-care practice in patients with allergic rhinitis following the self-care concept and Orem's theory. The sample consisted of patients who received therapy at the out-patient ENT clinic of Songklanagarind Hospital. The results indicated overall, self-care practice scores among patients with allergic rhinitis were moderate (mean = 2.97). When examining individual aspects of self-care practice, it was found that every aspect was on moderate-average, self-care practice in maintenance of self-value and interaction (mean = 3.41), prevention of hazards and complications (mean = 3.21), compliance with regimen medications and treatment (mean = 3.16), general health maintenance (mean = 2.79), proper rest and relaxation (mean = 2.78) and prevention of hazard and complication (mean = 2.60).

Allergic Rhinitis and its Impact on Asthma (ARIA) in collaboration with the World Health Organization (WHO 2010) states that knowledge on the path physiological mechanisms underlying allergic inflammation of the airways has resulted in better therapeutic strategies. New routes of administration, dosages and schedules have been studied and validated. In addition, asthma co-morbidity should be well understood in order to achieve optimal treatment for patients

Employee's Practice in**,** AR management, over counter medicine**,** keeping environment clean**,** compliance to medicines**,** and use of alternative medicines was established have a relation with wok productivity. A study by Peters *et al* (2000), noted that, In the case of allergic rhinitis, workers productivity was lowered by its treatment with non prescription anti histamines referred to as sedating antihistamines**.**

Studies examining knowledge, attitude, and practices of AR (KAP) have been conducted in many different fields and in various countries, such as the USA (Toy *et al.*, 2005. Willis and Wortly, 2006), conducted a study on nurse attitudes towards AR and influenza vaccinations. They found that the rates of vaccination might increase as a consequence of the development of education programs, emphasizing the rationale for health workers vaccination. A study by Pavia *et al.*, 2003), used anonymous questionnaires to collect demographics, health beliefs, attitudes, and medical knowledge data related to the AR. The study established that majority of the residents were aware that the AR could be treated, and were aware of the side effects of the treatment prescribed.

Summary of literature reviews

Symptoms of allergy have direct influence on the productivity of the affected patients. This affects their daily activities because the affected people get the symptoms while at work or at school thus hindering their activities. Some of the patients get severe forms of allergy requiring them to be absent from school or work. Those with mild symptoms of the disease are on duty but have poor concentration. This results in presenteeism. (Peters *et al* 2000)

Work impairment and lowered worker productivity is also caused medications by patients ,who take sedating anti histamines , resulting in the patient being drowsy, while on duty resulting in productivity loss. Productivity is enhanced by use of controller medications. This results in reduction in the prevalence of attacks resulting in improved productivity of those with allergies (Verster *et al* 2004).

Allergy has significant economic implications, including costs associated with increased attendance to health care facilities, and the time lost while attending the facilities, due to the reoccurring nature of the condition, (Shatz 2007). This is worsened by the complications of the disease. Controlled disease, equals better clinical, and financial outcomes, resulting in improved productivity

Gaps in the literature review

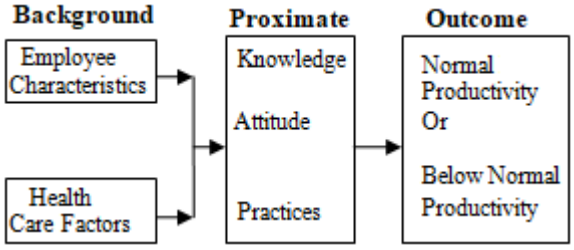
The literature studies, which have been reviewed, have addressed the issues of allergies; however they did not focus on allergies in institutions, in relation to work performance.

The literature is mostly on retrospectives studies

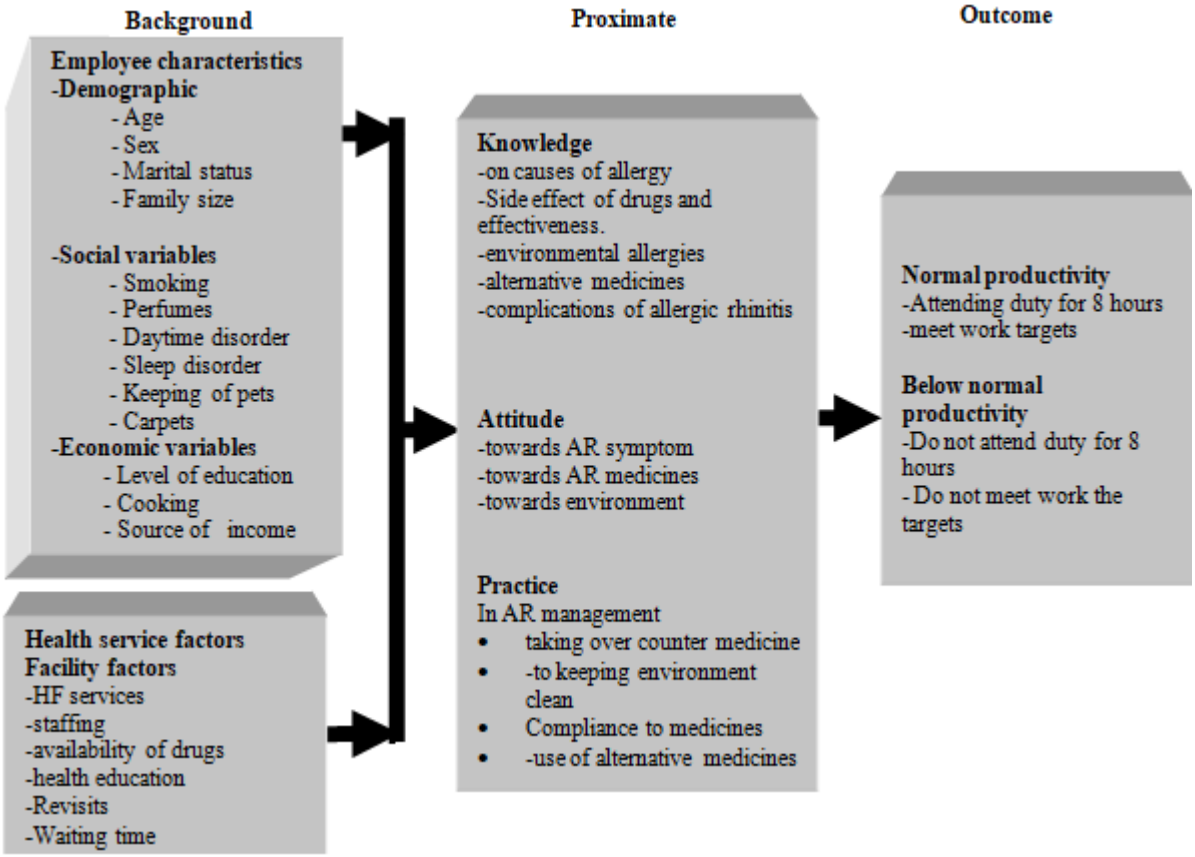
The studies excluded, patients knowledge, attitude, and, practice on allergic rhinitis and medicines used for treatment.

Most of the studies done either focused on the patients' knowledge, attitude, belief and practice in relation to the treatment or vaccination of the related influenza conditions. The studies too related the clinicians KAP towards patient care, however, in relation to work productivity, limited studies have this as a focus.

Conceptual framework



2.9 Operational Framework



4. Methodology and Materials

The study sought to investigate effects of Allergic Rhinitis on work productivity. This was a descriptive and analytical cross sectional study using both quantitative and qualitative research methods, of data collection. Data was collected from 384 diagnosed AR patients attending health facilities in Central Business District. Quantitative data were obtained from 10 HF. Qualitative data was obtained from the KII and FGD. Data was processed using SPSS and Microsoft Excel statistical computer packages.

Sampling procedure

Nairobi Central Business District was purposively selected because it holds most of the employees who work in Nairobi. A list of health facilities in the CBD was drawn. Each health facility was assigned a number from number 1 to 24.The CBD was divided into 3 clusters which included East, North and West District. Random sampling was done to select 3 health facility from each District a total of 10 health facilities were selected. In each health facility a total 39 patients diagnosed with AR purposively interviewed within a weeks of the data collection

HF Name	HF type	District
1. Burutu Dispensary	Medical Clinic	Nairobi East
2. Bakarani Clinic	Medical Clinic	Nairobi East
3. Alikune Dispensary	Nursing Home	Nairobi East
4. Apu Dispensary	Health Centre	Nairobi East
5. Biafra Medical Clinic	Dispensary	Nairobi North
6. Bibirioni Dispensary	Dispensary	Nairobi North
7. Badana Dispensary	Health Centre	Nairobi North
8. Al-Hamdu Medical Clinic	Medical Clinic	Nairobi West
9. Bombi Dispensary	Dispensary	Nairobi West
10. Amurt Likoni Clinic	Health Centre	Nairobi West
Source MOMS 2011		

5. Results

Introduction

The first part of the findings covers descriptive analysis which gives shows relationship between the independent variables (employee's characteristics; demographic, socio, economic and health service factors) and the dependent variables (work productivity). Findings describe whether there existed a relationship between the independent and independent variables. Chi square test (x^2) measured was used to measure relation. Where relationship was found the value P was less than 0.05.

The study was conducted at the Central Business District health facilities. It was conducted on patients who visited the health facilities suffering from allergic rhinitis and seek treatment. The study involved 384 employees. The mean of the respondent was 41 years. Male respondents were 56 % (218) as compared to the female who were 44% (171)

Characteristics of Eemployee's with AR in Relation to Work productivity

The study sort to establish the employee characteristics of those who suffered from Allergic Rhinitis based on the age, sex, marital status and family size in relation to work productivity. Respondents age category by work productivity. Figure 1 below gives a summary of the age category distribution in relation to work productivity of the respondents.

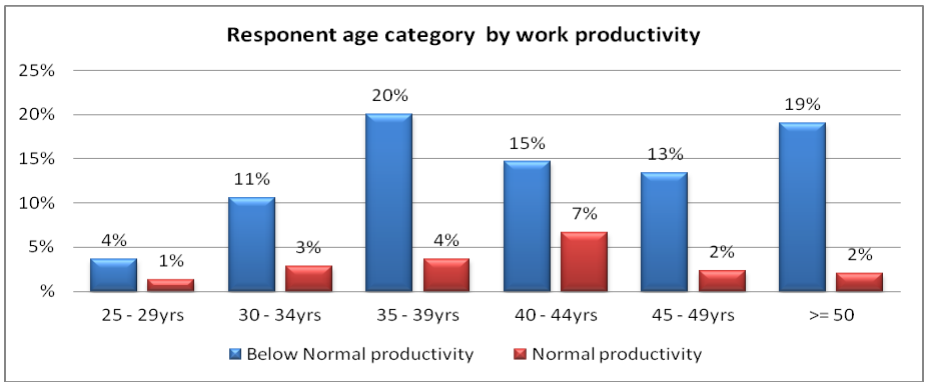


Figure 1: Respondents age category by work productivity (n= 384)

Across all age categories the proportion of the respondents' with below normal work productivity, with the highest (20%, 19%, 15% and the rest below 13%) of age categories 30-34 years,> 50 years, 40 -44 years and the rest category respectively. There was a significant relationship between age and work productivity of the respondents, with a p-value of .000.

This was supported by one of the KII that AR affects all ages

Overall, if we look at, allergic rhinitis affects between 10% of the patients. Of interest, in childhood, boys outnumber girls with allergic rhinitis. The sex ratio becomes approximately equal in adults and may even be more common in women in adulthood. In about 80% of cases, allergic rhinitis symptoms will develop before the age of 20 years, but symptoms of allergic rhinitis can develop at any age.
KII – health worker

Respondents' family size by work productivity

Table 1 below gives a summary of the respondents' family size in relation to work productivity.

Table 1: Summary of family size by work productivity (n=384)

Family Size	Below Normal productivity	Normal productivity
None	21%	7%
1 - 3	39%	6%
4 - 6	16%	5%
7 - 10	5%	.8%

The proportion of family size is highest (39%) with 1-3 members with below normal work productivity and only 6% with normal work productivity, the highest (7%) with normal work productivity has no family members. While the highest family size (7-10), has the lowest (.8%) normal work productivity. Despite the outcome, there was no significant relationship between family size and work productivity of respondents' diagnosed with AR.

6.1 Social variables

The sort to establish if there was a relationship between social variables and work productivity of the respondent's suffering from AR, areas of study focused on smoking, keeping pets, carpet use and use of perfumes.

Smoking in the past one week and work productivity

Figure 2 below highlights the respondents' aspect of smoking in the last one week in relation to work productivity as a social variable. Majority (72%) with AR had never smoked had below normal work productivity, while only 12 % had normal work productivity

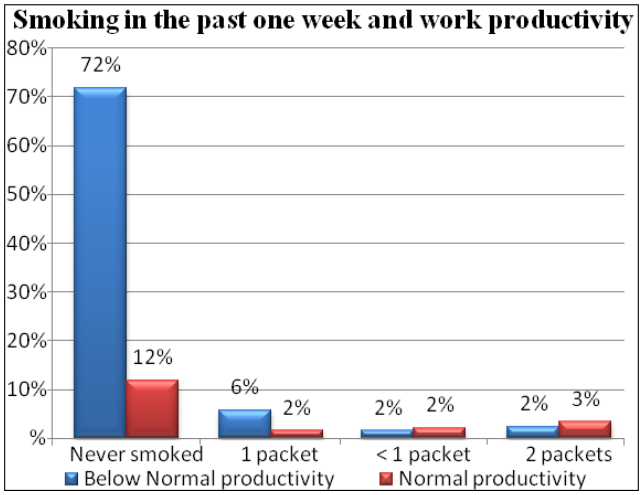


Figure 2: Summary of smoking in past one week by work productivity (n=384)

Pets housing and work productivity

Figure 3 below highlights the relationship between pets housing and work productivity as a social variable.

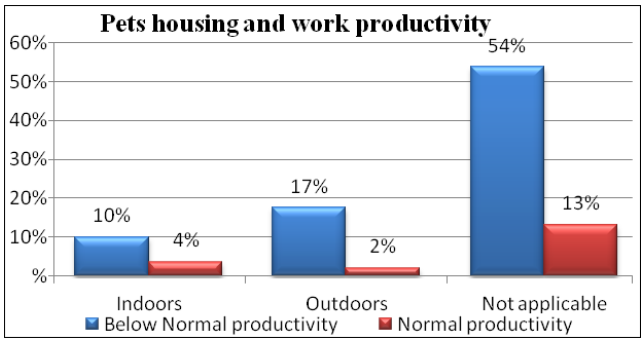


Figure 3: Summary of houses with pets and work productivity (n=384)

Majority (54%) did not keep pets had below normal work productivity, while 13% had normal work productivity, while 17% and 10% with indoor pet housing and outdoor respectively had below normal productivity and only had 4% and 2% normal work productivity.

The Eeconomic Status of employee'sAR and Work productivity.

The study sort to determine whether economic variables had any influence on work productivity in relation to the respondents' with AR condition, some of the variables considered in economic were: level of education of the respondents, job grade and the cooking fuel used.

Level of education

Figure 4 below gives a summary of the respondents' education level by work productivity.

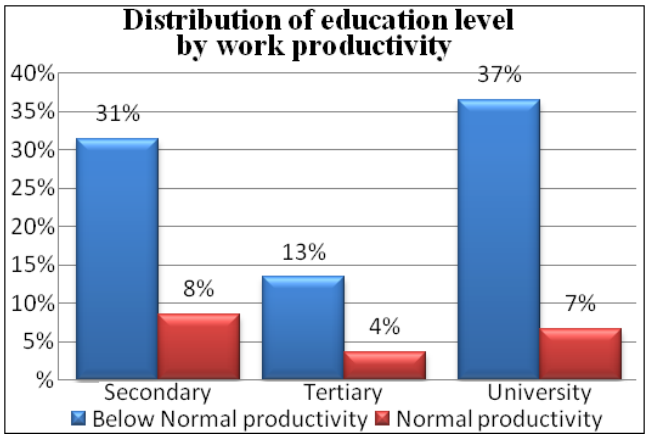


Figure 4: Summary of education level by work productivity (n=384)

A high proportion across all the respondents' (37%, 32% and 13%) had acquired university, secondary and tertiary education levels respectively with below normal work productivity, while 8%, 7% and 4 % with secondary, university and tertiary having normal work productivity respectively. There was no relationship between ones' education level, AR and work productivity.

Main source of income

Figure 5: Summary of respondents' job grade by work productivity (n=384) there was a relationship between main source of income and work productivity p values > .05

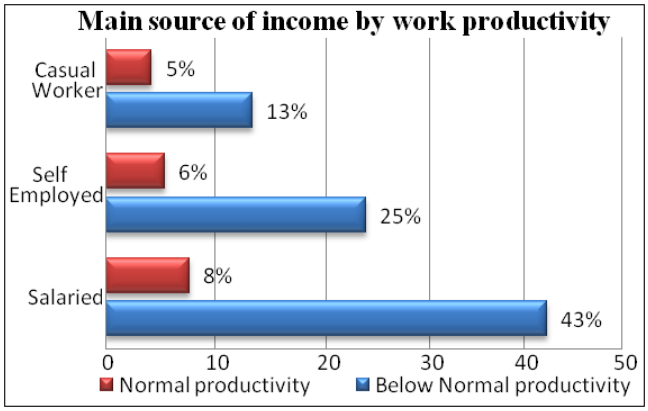


Figure 5: Summary of main source of income by work productivity (n=384)

This was also confirmed by KII

When considering the impact of allergic rhinitis, there are several factors to keep in mind. First, there's the impact on the quality of life for the patient who is suffering from the symptoms of rhinitis. Second, there's the financial impact of the disease on the overall healthcare system. Poor sleep quality will result in fatigue the following day, which can obviously interfere with performance in school or at work. Severe cases may result in absenteeism, but reduced performance despite showing up at school or work (termed "presenteeism") may also have a significant impact on an individual's quality of life. KII- health worker

Respondents' cooking fuel by work productivity

No relationship was found between work productivity and type of fuel used by employees with AR.

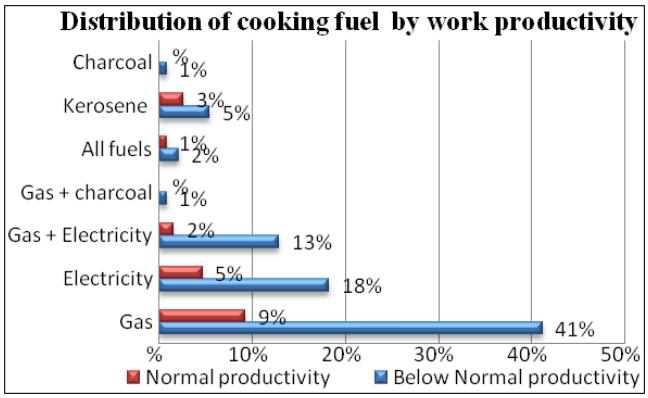


Figure 6: Summary of cooking fuel type by work productivity (n=384)

Health service Factors of Employees with AR and Work Productivity

The study sort to establish how health service factors influence work productivity of the employees suffering from AR within the central business district. Some of the variables of HF considered were treatment given at the facility, number of visits to the HF and waiting time at the HF by the respondents.

Treatment given by work productivity

Figure 7 below gives a summary of the type of treatment given to the respondents and how it influenced their work productivity.

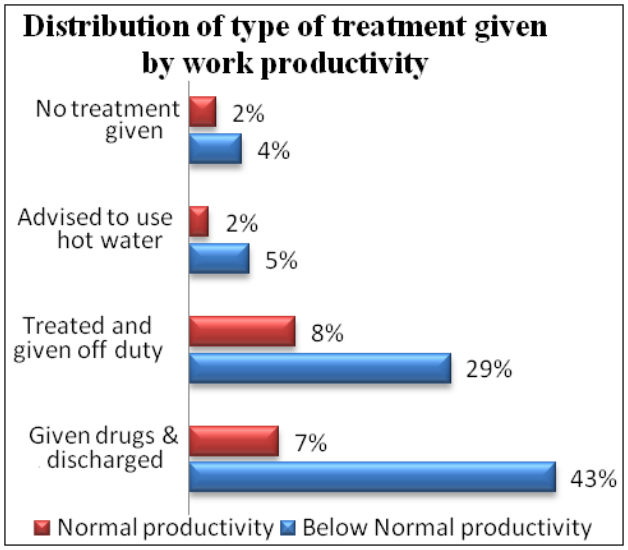


Figure 7: Summary of type of treatment given by work productivity (n=384)

The proportion across board indicate that 43%, 29 %, 5 % and 4% respectively were given drugs and discharged, treated and given off duty, advised to use hot water and not given treatment had below normal work productivity, while of the same nature 7%, 8 % and 2 % respectively had normal work productivity. This had a significant relationship with a p-value of .046

Availability of drugs at the HF by work productivity

Table 2 below gives levels of availability of AR drugs using a rating scale in relation to work productivity of the respondents.

Table 2: Work Productivity by Availability of drugs

Drugs Availability	Work Productivity by availability of drugs	
	Below Normal productivity	Normal productivity
Never	264 (68%)	48 (12%)
Rarely	20 (5%)	13 (3%)
Sometimes	29 (7%)	12 (3%)
Frequently	3 (.8%)	0 (0%)

Of the 80% with who indicated that drugs are never available at the HF for AR, majority (68%) level of work productivity was below normal, while 12% had normal work productivity despite there never being drugs available. There is a statistical relationship between availability of AR drugs at the HF and work productivity, with a p-value of .002.

Number of visits to the HF for AR by work productivity

Figure 8 below gives a summary of the number of visits the respondents made to the HF for AR treatment and how this affected their work productivity.

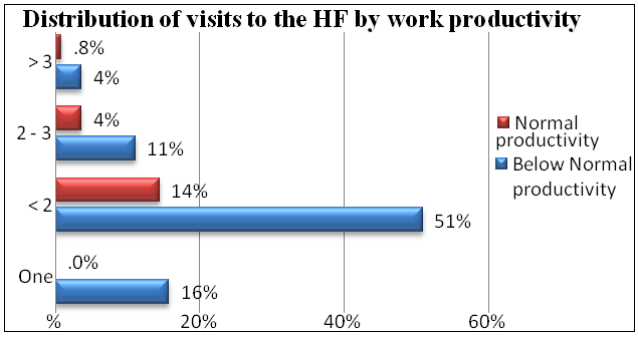


Figure 8: Summary of number of visits to HF by work productivity (n=384)

Of those who made < 2 visits accounted for 51% had below normal productivity, while only 14% had normal productivity, those with 2 – 3 visits, 11% had no below normal productivity, while 4% had normal productivity. The number of visits to the HF to seek for AR treatment had a significant relationship with work productivity, with a p-value of .001.

Waiting time at the HF during AR treatment by work productivity

Figure 9 below gives a summary of the hours in terms of waiting time while at the HF seeking for AR treatment and how this affected work productivity.

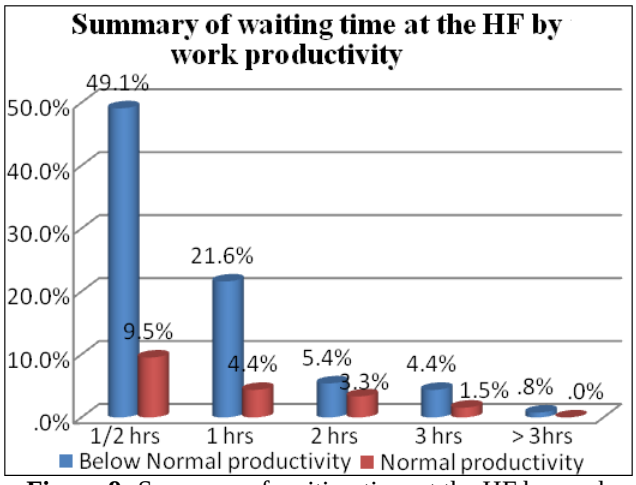


Figure 9: Summary of waiting time at the HF by work productivity 9n=384)

Of 49.1% who waited for only half an hour, they had below normal productivity, while 9.5% had normal productivity, subsequently; those who waited for 1 hour (21.6% and 4.4 %) had below normal productivity and normal productivity respectively. According the statistical test, there was relationship between waiting time and work productivity with a p-value .025.

One of the most important tools in approaching a patient with rhinitis is the history. First, it's important to characterize the presentation of the patient's symptoms. After clarifying when a patient's symptoms occur and exactly which symptoms they are having, a physical exam can be very helpful in evaluating the patient with suspected allergic disease. First, it is useful to look at the patient's face to look for evidence, As healthcare providers, we all have patients who seem to have clear-cut disease but who do not respond to the treatment that we thought would help them. There is an appropriate role for the allergy subspecialist to help manage patients with allergic disease. One would think that management of allergic rhinitis would be straightforward and patients would largely be very happy with their treatment. In fact, many patients are not satisfied with their level of symptom relief
KII – health worker

The above are comments from a KII when asked about the Health services factors that affect AR management.

Knowledge, attitude and practice on AR and effect on work productivity

The study to establish whether knowledge on AR, drugs and side effects of drugs used in AR and herbal treatment had a relationship with their work productivity.

Knowledge of effects (drowsiness) of AR drugs

Figure 10 gives a summary of knowledge on effects of AR drugs with the focus on drowsiness using a rating scale to measure the effect on work productivity.

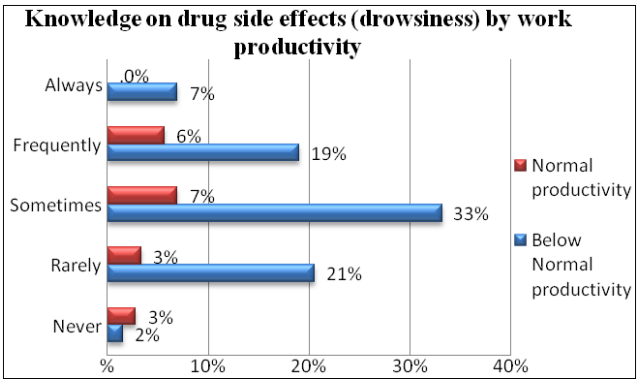


Figure 10: Knowledge on drug side effects (drowsiness) by work productivity (n=384)

Majority (33%) with below normal productivity had knowledge that sometimes AR drugs caused drowsiness, while 7% had normal productivity. Then 21% and 19% had rarely and frequently experienced drowsiness of the AR drugs had below normal productivity, with only 3% and 6% having normal productivity. The study have shown a relationship between knowledge on drowsiness as a side effect affecting work productivity with P-value .000

Most of the discussants in the FGD were able to mention at least AR symptoms & side effects.

Typically, allergic rhinitis is characterized by 1 or more of the following symptoms: nasal congestion; sneezing; and itching. Rhinitis is often associated with inflammation; FGD discussant

Knowledge of causes (lethargy) of AR drugs

Figure 11 below gives a summary of the knowledge of the AR drug side effect (lethargy) on work productivity.

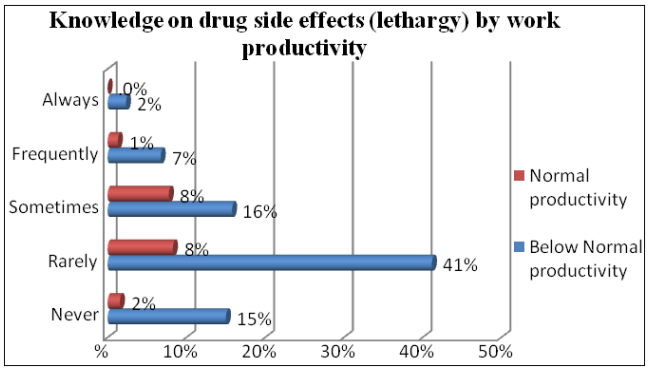


Figure 11: Knowledge on drugs side effects (lethargy) by work productivity (n=384)

Majority (41%) had knowledge of lethargy as a side effect of the AR drugs and rarely experienced and had below normal productivity, while 8% had normal productivity. The subsequent respondents (16%, 15% and 7%) had sometimes, never and frequently experienced lethargy had below normal productivity, while 8% and 7% who rarely, sometimes and frequently who had knowledge on lethargy had normal productivity. This had a significant relationship with work productivity with a p-value of .001.

Knowledge of effects (insomnia) of AR drugs

Figure 12 below gives a summary on the knowledge of side effects (insomnia) and how this influenced work productivity of the respondents.

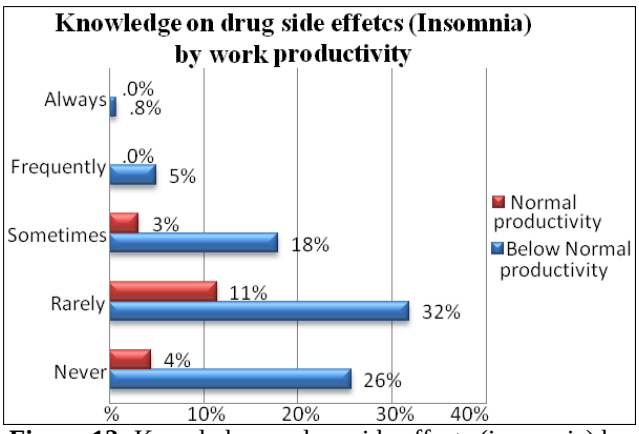


Figure 12: Knowledge on drug side effects (insomnia) by work productivity (n=384)

Of 32% who had knowledge on AR drug side effect of insomnia rarely had below normal productivity, while 11% had normal productivity, 26% never knew had below normal productivity, while 4% had normal productivity. This had a significant relationship with work productivity with a p-value of .009.

Knowledge alternative treatment (herbs) of AR

The (figure 13) below gives a summary of knowledge on alternative treatment herbs on AR and how this affects work productivity.

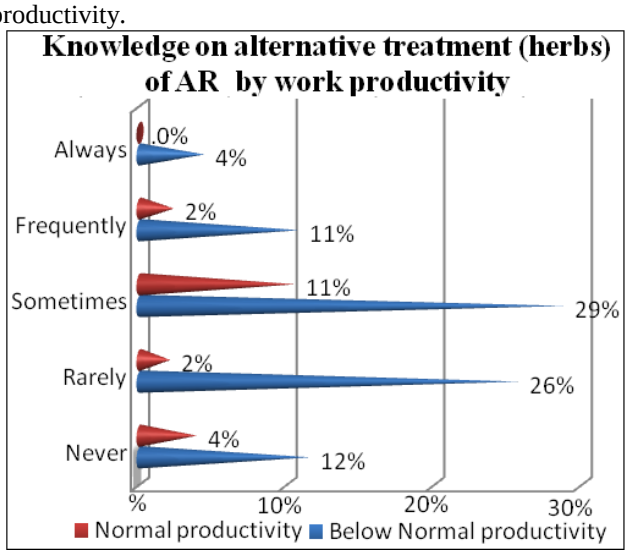


Figure 13: Knowledge on alternative treatment (herbs) of AR by work productivity (n=384)

Majority (29%) with knowledge of herbs sometimes had below normal productivity, while 11 % had normal productivity, 26 % who indicated rare level of knowledge on herbs had below normal productivity, while 2% had normal productivity. The study established that there was a significant relationship between knowledge on herbs as treatment for AR and work productivity with a p-value .000.

Attitude towards AR signs, symptom and treatment and work productivity

The study further sort to establish whether the respondents' attitude towards AR signs and symptoms and treatment had an influence on their work productivity. This section highlights some of the key findings.

Attitude toward Dry mouth by work productivity

Figure 14 below gives the rating of the respondents in relation to their attitude towards a sign/symptom of dry mouth and how this affects work productivity.

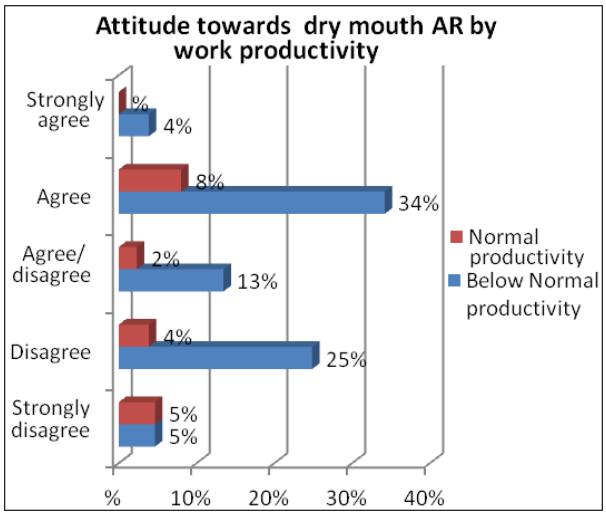


Figure 14: Attitude towards dry mouth AR by work productivity (n=384)

Majority (34%) agree that dry mouth affects work productivity had below normal work productivity, while 8% had normal work productivity. Despite the fact that 25 disagreed had below normal work productivity, while only 4% had normal productivity, 5% who strongly disagreed had both below normal work productivity and normal productivity respectively. There was a significant relationship with work productivity with a p-value of .000 and a value of -.130.

Poor concentration attitude towards AR

Figure 15 below highlights the attitude of the respondents' towards poor concentration and how this influenced work productivity.

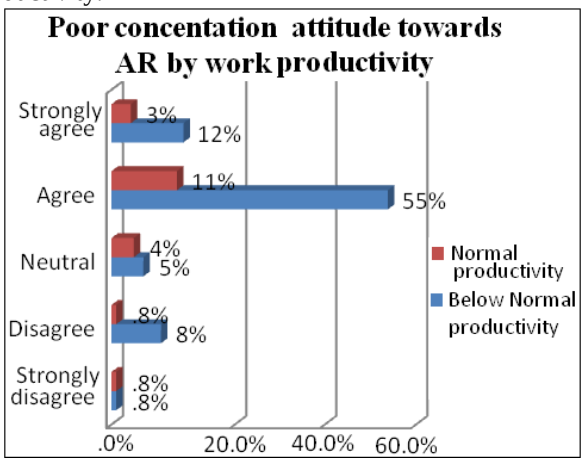


Figure 15: Poor concentration attitude towards AR by work productivity (n=384)

A half of the respondents (55%) had an attitude that AR causes poor concentration at work place as such they had below normal productivity, while only 11% had normal productivity with the same attitude.

Attitude towards working Environment

Figure 16 below gives a summary of the respondents' attitude towards working environment in relation to work productivity; this was to establish their attitude as the environment is concerned with AR and whether they associated it with AR condition.

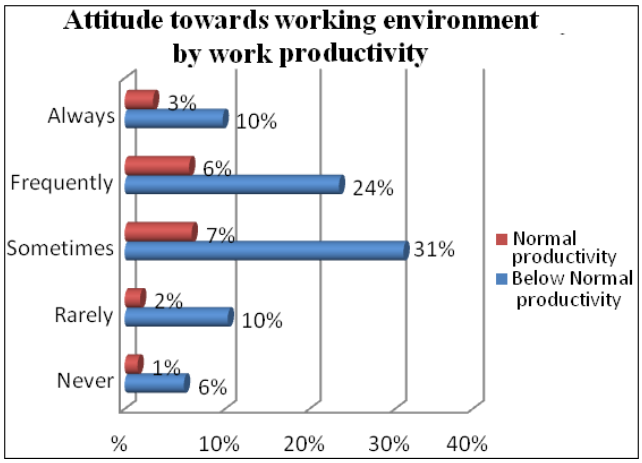


Figure 16 : Attitude towards working environment by work productivity (n=384)

Majority (31%) rates at sometimes with a below normal productivity, while 7% with normal productivity.

Practice of respondents in relation to AR

The study sort to establish the practice adapted by the respondents suffering from AR as concerns seeking treatment, purchase of the over the counter treatment, compliance of treatment given at the HF and use of herbal treatment for AR.

Seeking treatment of AR by work productivity

Figure 17 below highlights the practices adapted by the respondents in relation to treatment seeking for AR.

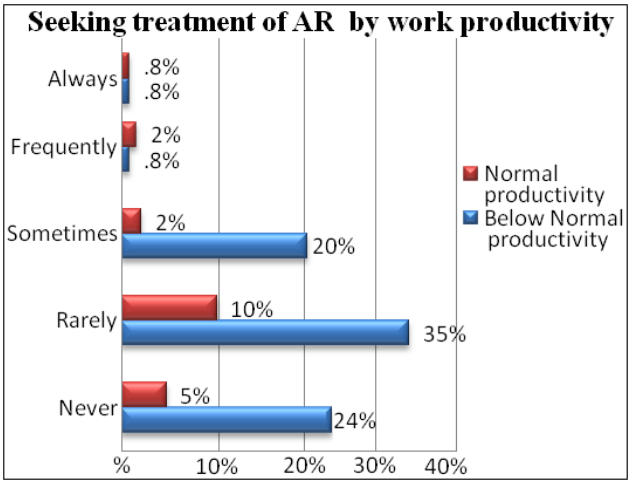


Figure 17: Seeking treatment of AR by work productivity (n=384)

Majority (35%) of those who indicated that they rarely sought treatment had below normal productivity, while 10% had normal productivity. Of the 24% who never sought treatment had below normal productivity, and 5% had normal productivity. The seeking of treatment had a significance relationship with work productivity with a p-value of .000.

Over counter treatment by work productivity

The figure 18 below gives a summary of the respondents' who sought over the counter treatment and how this influenced work productivity.

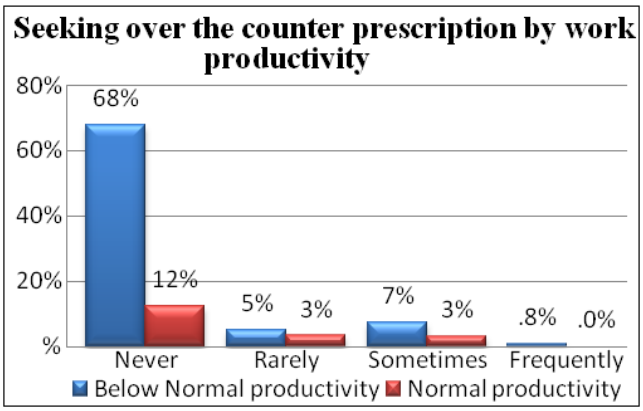


Figure 18: Seeking over the counter prescription by work productivity (n=384)

Of the 68% who indicated that they never sought over the counter treatment had below normal work productivity, while 12% had normal productivity with the same rating. The rest who rarely sought over the counter treatment for 5% had below normal productivity, while 7% accounted for sometimes with below normal work productivity in the same rating accounted for 3% and 3% respectively with normal productivity. This practice had a significant relationship with work productivity with a p-value of .002.

Compliance to prescription given by work productivity

Figure 19 below highlights the compliance rates by work productivity of the respondents who were given treatment at the HF.

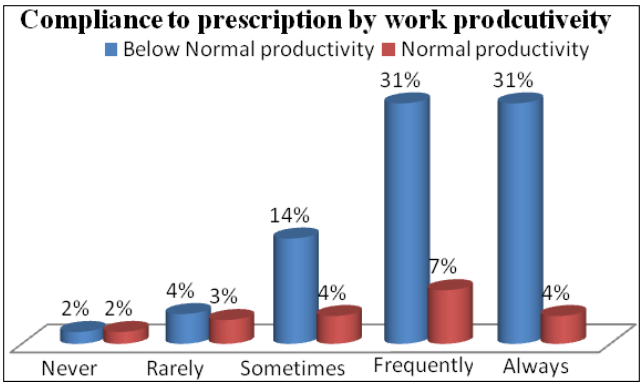


Figure 19: Compliance to prescription by work productivity (n=384)

Majority (31%) always and frequently who compliant to the prescription given had below normal productivity, while 4% and 7% had normal productivity with the same rating. The

findings established that there was a significance relationship between compliance to the prescription and work productivity with a p-value of .000 and a value of -.241.

Comments of FGD discussant when asked the AR knowledge and attitude

Many patients have the false perception about the sedative effect of this medication. Patients often believe that if they do not perceive drowsiness with the use of a first-generation antihistamine that they do not have impairment of performance or reaction time when driving or operating machinery. In fact, studies show just the opposite. Patients need to be told that just because they don't feel sleepy; it does not mean that they are not impaired. These effects can be compounded with the simultaneous use of other central nervous system-active agents, such as sedatives, hypnotics, or alcohol.
FGD - discussant

Seeking Herbal AR treatment by work Productivity
Figure 20 below gives a summary of the rating in relation to seeking herbal treatment by the respondents' by work productivity.

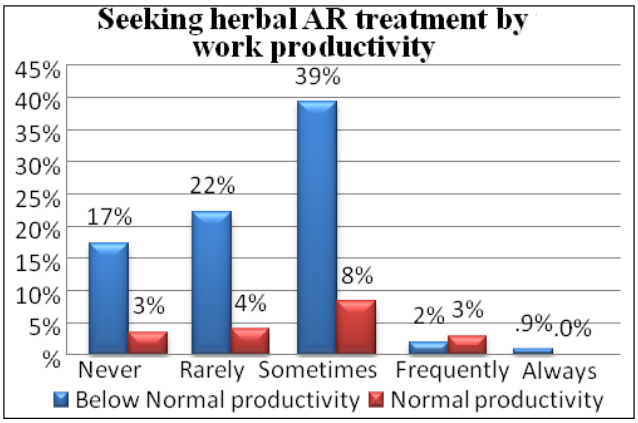


Figure 20: Seeking herbal AR treatment by work productivity (n=384)

Majorities (39%, 22% and 17%) respectively indicated sometimes, rarely and never seek herbal treatment for AR had below normal productivity, whereas the others with normal work productivity with the same rating accounted for 8%, 4% and 3% respectively. There was a significant relationship between seeking herbal treatment and work productivity with a p-value of .000.

Outcome on Work productivity
Figure 21 below gives a summary of the outcome of the study based on work productivity.

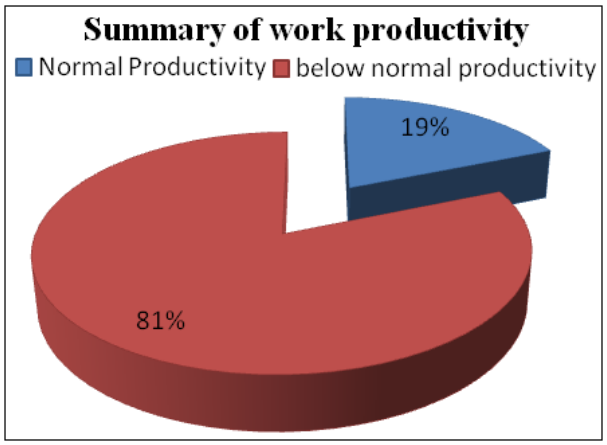


Figure 21: Summary of outcome on AR by work productivity (n=384)

The outcome of the study was the outcome of work productivity based on working for 8 hours and meeting the set target of the day, while the opposite was to be below normal productivity. Majority (81%) indicated that they were below normal productivity, whereas, only 19% were within the normal productivity.

Table 3: Summary of key variables influencing work productivity

	Summary of Key Findings on Effects Of Allergic Rhinitis on Work Productivity				
No	Demographic	df	P-Value	r	r^2
1	Smoking	3	.000	.317	.100
2	Seeking treatment	4	.000	.068	.068
3	Treatment given	3	.046	.141	.020
4	Revisit (No. Of Visits)	3	.001	.138	.019
5	Availability of Drugs	3	.002	.131	.017
6	Over Counter treatment	3	.002	.131	.017
7	Symptoms (AR) dry mouth	4	.000	.-130	.016
8	Effects of drugs (Drowsiness)	4	.000	.118	.014
9	Waiting time	4	.025	.100	.010
10	Herbal	4	.000	.096	.009
11	On causes (Lethargy)	4	.001	.087	.008
12	On insomnia	4	.009	.050	.003
13	Main source of income	4	.009	.050	.003
14	Herbal treatment	4	.000	.014	.002
15	Medication (AR)	4	.001	.040	.002
16	Age	5	.009	-.092	- .018
17	Compliance	4	.000	-.241	-.482
18	**Outcome**	Normal Work Productivity 18.8% (73) Below Normal = 81.2% (316)			

The table 2 above gives summary key variables that influenced work productivity. The P value column shows the Chi square test which was used to measure the significance between the independent and the dependent variables. The test of significance was at 0.05.

6. Discussion

Characteristic of Employee's with AR in Relation to Work Productivity.
The study established that demographic characteristics of employee's with AR such as age had a relation with work productivity. Younger employees had less work

productivity than older ones. Several studies on AR by Sibbald et al (1995) and Ponsonby et al (1999) have found an inverse relationship between work productivity and age to the children. The study focused on school going children with AR and established that as age decreased work productivity decreased AS age decreased.

Employee's social characteristics such as smoking, perfume use, daytime and sleep disorder, keeping of pets and having a carpet in the house had no relation with work productivity. This study finding did not agree with Nicolai et al (2003) findings. According to Nicolai et al (2003) AR reaction is triggered by grass pollen, tree pollen mould; animal dander; house dust mites, occupational allergens, food allergens, and other similar inhaled allergens. Nicolai established that patients with AR and lived in the above socio environment had a high visit had higher visits to the health facility thus reducing their work productivity. Venn et al (2001) in their study reported that the increased the risk of allergic sensitization could be a significant contributing factor in the increasing prevalence of AR.

Employees who were active smoker were found to have less work productivity as compared to those who did not smoke. Cross-sectional studies by Crockett et al (1995) showed that children or adolescents with AR were smokers were more likely to be absent from school than those with AR and were not smokers. He continues to argue that conversely, smokers suffer from AR s than nonsmokers and that Tobacco smoking may increase allergenic sensitization in occupational settings.

Relationship between Economic Status of Employee's AR and Work Productivity

Employee's economic characteristics such as level of education, cooking, main source of income were established in this study to had no a relation to work productivity. A study by Blaiss (2004) on AR prevalence and economic implications reported that, AR not only, cause significant personal suffering, but also had a substantial economic impact on society at large. The economic impact is felt as a result of indirect costs due to loss of productivity and direct costs as a result of outpatient clinics. Lindegren (2000) also concurs with this study as he noted that individual economic status is the crucial determinant of the cost of illness and, understanding individual health related behavior in relation to their work. This study did establish that there was a significant relationship between the main source of income and productivity, which influenced the level of income especially for the self-employed and casual workers.

AR has major economic implications including costs associated with increased attendance to health care facilities, and the time lost while attending the facilities, due to the reoccurring nature of the condition. Shatz (2007) states that economic status has significant influence on AR management this elaborate the vicious circle of ill health and poverty. Different studies in South Africa by Eur Respir (1996) have shown that then prevalence AR was higher in urban due to the fact that pollution, higher in town than elsewhere but they did not look at other confounders in the diagnosis and in the management of the disease.

In this study the researcher did not focus on the type of pollutions surrounding the employee with AR but assumed that the employee lives and works in the Nairobi county and is exposed to environmental pollution. British birth cohort study by Wrigh et al (1994) established that children of fathers with higher social class occupations were more likely to have low prevalence of AR than those with fathers of low social economic class. This study did not agree with the two studies discussed above. This may be due to the fact that this study did not look at the main source of income in terms of monitory terms but rather on type of employment.

The Health Service Factors of Employees with AR and Work Productivity

Health service factors included HF services, staffing, availability of drugs, health education, revisits and waiting time was established in this study to have had a relationship with work productivity. Employees who had more frequent visits to the HF had less work productivity. WHO (2000) argues that health care utilization is mainly through admissions, cost of pharmaceuticals, physician consultations and emergency outpatient attendance. High health care utilization rates, particularly for urgent visits, hospitalization, and emergency visits, can be decreased with appropriate management of the disease especially with patients with AR. WHO studies did not look at specific health service variables but gave a generalized statement

Knowledge, attitude and practice of employees with AR and work productivity

Employee's knowledge on causes of allergy, side effect of drugs and effectiveness, environmental allergies, alternative medicines, complications of allergic rhinitis was established to have a relationship with work productivity in this study.

Symptoms of allergy have direct influence on the productivity of the affected patients. This affects their daily activities because the affected people get the symptoms while at work or at school thus hindering their activities. This results in presenteeism as argued by Peters *et al (2000*). Symptoms of allergy have direct influence on the productivity of the affected patients. This affects their daily activities because the affected people get the symptoms while at work or at school thus hindering their activities

Work impairment and lowered worker productivity is also caused medications by patients ,who take sedating anti histamines , resulting in the patient being drowsy, while on duty resulting in productivity loss. Productivity is enhanced by use of controller medications states Verster *et al* (2004). This results in reduction in the prevalence of attacks resulting in improved productivity of those with allergies. Allergic Rhinitis and its Impact on Asthma (ARIA) in collaboration with the World Health Organization (WHO 2010) states that knowledge on the pathophysiological mechanisms underlying allergic inflammation of the airways has resulted in better therapeutic strategies. New routes of administration, dosages and schedules have been studied and validated. In addition, asthma co-morbidity should be well understood in order to achieve optimal treatment for patients

Employee's Practice in**,** AR management, over counter medicine**,** keeping environment clean**,** compliance to medicines**,** and use of alternative medicines was established

have a relation with wok productivity. A study by Peters *et al* (2000), noted that, In the case of allergic rhinitis, workers productivity was lowered by its treatment with non prescription anti histamines referred to as sedating antihistamines However, the geographical and temporal distributions as well as the associations of such diseases differ largely and these differences can be used to better understand the mechanisms of allergic diseases. Risk factors of rhinitis may intervene at all ages in life and epidemiology has greatly contributed in exploring them.

7. Conclusion and Recommendations

Conclusion

Based on the key findings of this study it is certain that employee's with AR age influenced their work productivity, whereby productivity of the employee was within the normal productivity given the age category of the respondents. Other demographic factors like sex, marital status, and family size, level of education did not have any relation with work productivity.

Social factors of employees with AR such as cigarette smoking and keeping pets did not have any relation with work productivity. The main source of income of the employee's diagnosed with AR influenced their work productivity. Health service factors of employees with AR were the major variables that had influence on work productivity. These factors included, seeking treatment, treatment given, availability of drugs, over the counter treatment, waiting time at the health facility and number of visits to the health facility for AR treatment.

The Knowledge, attitude and practice of employees with AR had an influence on their work productivity. Knowledge on AR treatment, symptoms of side effects if on AR medication, and alternative (herbal) treatment of AR and compliance to the treatment given at the health facility influenced work productivity.

Recommendation

Based on the study finding the following recommendations were made

Programmes recommendations: The MOPHs to develop IEC materials that promote awareness level of AR within the CBD**.** Furthermore, collaborate with employers to develop awareness programme aimed at impacting knowledge and management of AR among the employees.

Further Research

On analysis of work productivity by employees diagnosed with AR. This will provide the employers and health workers with information on the best treatment regime for AR patients so as to avoid treatment that will make the employee to be absent from work or lessen their productivity when at work.

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Map of Nairobi County