IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 20, Issue 4. Ver. II (April. 2018), PP 76-84
www.iosrjournals.org

An Investigation of Iron Intake of Form Two Girls at Dzivarasekwa 2 High School in Harare

[1]Clever Marisa, [2]Dr. Johannes Marisa and [3]Precious Mpofu
[1]*Part-Time Lecturer, Faculty of Commerce, Reformed Church University*
[2]*Medical Practitioner, Westview Clinics, Harare*
[3]*Teacher, Dzivarasekwa 2 High School, Harare*
Corresponding auther: Clever Marisa

Abstract: *The study investigated the iron intake of form two girls at Dzivaresekwa 2 High School. Iron is a component of several proteins including enzymes, cytochromes, myoglobin and haemoglobin. It can exist in various oxidation states including the ferrous, ferric and feirl. The study was conducted after the school experienced more incidences of form two girls falling down, feeling dizzy and frequently visiting local clinics for treatment. The study intended to establish iron rich foods taken by form two girls at Dzivarasekwa 2 High School, assess the frequency of consumption of iron giving foods in the diet of form two girls at Dzivaresekwa 2 High School and determine factors that influence iron intake of form two girls at Dzivaresekwa 2 High School. The qualitative method was used in the study. The interviews and 3-day food record were used to collect data. Purposive and convenient sampling techniques were used in the study. Content analysis was used on qualitative data. Eighty participants were involved in the study whose ages ranging from 12 to 16 years. The study found that majority of participants (80%) consumed junk foods which are not healthy to their bodies, majority of participants (80%) were coming from an average of six family members, 75% of participant's parents and guardians were not formally employed, 30% of the participants were staying with relatives suffering from anaemia, the majority of participants had little knowledge on the sources of iron giving foods and peer influence affected the choice of participants to consume proper food. The study recommended teachers to take note of struggling participants for assistance and the government to also introduce feeding programs in secondary schools.*

Key words*: Iron, Anaemia, Deficiency Disease, Teaching, School, Nutrition, Diet*

Date of Submission: 27-03-2018 Date of acceptance: 10-04-2018

I. Background To The Study

According to Nelson, Bakalion and Trivedi (1994), iron deficiency is the most common cause of anaemia globally. Michael, White, and Rhodes (2008) describe anaemia as a condition in which the number of red blood cells or their oxygen carrying capacity is insufficient to meet the physiological needs. When one is anaemic, the number of red blood cells is lower than normal. Anaemia reduces the capacity of blood to carry oxygen. Cook and Finch, (2007) concur with Nelson et al (1994) that people with anaemia feel tired, appear pale, develop palpitations and become short of breath.

According to Michael and Agneta (2008) anaemia affects more than a billion people in the world. It is generally believed that at least half of anaemia cases worldwide are due to nutritional iron deficiency. Other possibly important causes of nutritional anaemia in addition to iron deficiency include deficiencies of folic acid and vitamin B12 (Soekarjo, Delee and Marx, 1997). Michael and Agneta (2008) explain that folic acid, along with vitamin B12, is important for formation of red blood cells. Scott and Pritchard (1997) claim that lack of these two vital nutrients leads to variety of anaemia called macrocytic anaemia. This means the red blood cells appear bloated and large and have a reduced capacity to carry oxygen. Iron deficiency anaemia has serious health consequences, especially for girls who go for menstruation.

Alton (1996) describes menstruation as a monthly shedding of a female's uteral lining. Mentruation lasts about 3 to 5 days (average) and contains blood and tissue that exits her body through the cervix and vagina. The first day of menstruation is the first day of a girl's period. Michael and Agneta (2008) explain that anaemic pregnant women are at greater risk of death during the stage when the baby is developing from a single cell after conception into an embryo and later to foetus, referred to as the prenatal period. The pregnant mother is likely to bleed excessively.

It is thus said by Cook and Finch (2007) that a deficient intra-uterine blood supply to the foetus due to iron deficiency anaemia during pregnancy may result in premature labour, still birth, abnormal labour and

perhaps lower foetal weight. Worldwide, iron deficiency anaemia remains an enormous problem as more than 500 million people suffer from this condition. (Michael and Agneta, 2008) posit that the most important causes of anaemia are severe malnutrition and infection with hookworm. Apart from specific subgroups, iron deficiency in an individual must be considered to be a symptom of a certain condition, for example experiencing bleeding from the gums, the cause of which must be identified and treated.

It is well recognized that iron deficiency is not a desirable condition, as it is associated with many biochemical changes and clinical symptoms, with decreased work performance, increased susceptibility to infections, and impaired neurological function (Cook & Finch, 2007). Iron deficiency, however, is not a condition with a lethal outcome, in contrast to progressive hereditary and secondary haemochromatosis, and some diseases associated with iron catalyzed oxygen radical damage (Dallanan, 2002). Additionally, Peter (2010) claims that the number of girls at puberty stage in secondary schools feels dizzy and weak. Soekarjo, Delee and Kusin (2004) describe puberty as the process of physical changes through which a child's body matures into an adult body capable of sexual reproduction. Empirical evidence has shown that iron deficiency has negative impact on the health of girls at Dzivaresekwa 2 High School.

Statement of the Problem

The incidence of form two girls at Dzivaresekwa 2 High School falling down during school assemblies and frequently visited local clinics seeking medication as they felt dizzy and weak were high. Teachers also reported that some of the form two girls were no longer participating well in class as some felt sleepy and frequently requested to be excused from lessons as they sought fresh air outside the classroom. Anaemia is a condition which decreases the total amount of red blood cells (RBCs) or hemoglobin in the blood or a lowered ability of the blood to carry oxygen.

Objectives of the Study

The study intended to:

1. Establish iron rich foods taken by form two girls at Dzivarasekwa 2 High School in Harare.
2. Assess the frequency of consumption of iron giving foods in the diet of form two girls at Dzivaresekwa 2 High School.
3. Determine factors that influence iron intake by form two girls at Dzivaresekwa 2 High School.

II. Literature Review

The Concept of Iron

DuBois and David (2005) view iron as a component of several proteins including enzymes, cytochromes, myoglobin and haemoglobin. Michael, White and Rhodes (2008) say that almost two thirds of iron is found in haemoglobin that is present in circulating erythrocytes and involved in the transport of oxygen from the environment to tissues throughout the body for metabolism. Soekarjo, Delee and Kusin (2004) postulate that iron is a mineral found in plants and animals and all living things. It is an important component of haemoglobin, the part of red blood cells that carries oxygen from the lungs to the body. Iron gives haemoglobin the strength to carry (bind to) oxygen in the blood, so oxygen gets to where it needs to go.

Iron Deficiency

DuBois and David (2005) believe that iron deficiency is the most common nutritional disorder, which affects about 20% of the world population. Iron deficiency is a systemic condition, which has many non-haematological consequences: it impairs physical endurance, work capacity, infant growth and development, and depresses immune function (Michael and Agneta, 2008).WHO (2008) concurs to the aforesaid by saying that iron deficiency is one of the most common diet-related disorders ranked between 66%-80% worldwide but this situation is more prevalent in developing countries.

According to Marx (1997), animal models have revealed several mechanisms by which iron deficiency may affect cognition; these include changes in brain iron content and distribution, and in neurotransmitter function. Body iron stores, such as central nervous system iron, decrease before red blood cell production is affected by iron deficiency. Lawrence and Dennis (2011) highlight three stages of iron deficiency as stage (I) increased utilization of iron stores and serum ferritin falls. Haemoglobin (HGb) levels remain WNL; stage (II) with depletion of iron stores, serum iron falls, and transferring levels begin to rise. Haemoglobin synthesis decreases; and stage (III) with additional reduction in haemoglobin synthesis, hypochromic and microtyic erythrocytes are produced. This can be addressed by increasing iron giving foods in the diet such as liver, spinach, lentils, fish, meat, eggs etcetera.

Marx (1997) recommends the type foods that help the body to absorb iron from iron-rich foods. In order to absorb the most iron from the foods consumed, suggested girls to avoid drinking coffee or tea or consuming calcium-rich foods or phsi-drinks with meals containing iron-rich foods. In order to improve the

absorption of iron, he recommends girls to consume it along with a good source of vitamin C- such as orange juice, broccoli, or strawberries or consume non-heme iron foods with a food from the meat, fish, and poultry group.

Michael and Agneta (2008) suggest that in case girls find challenges in getting enough iron from food sources, they may need an iron supplement though there is need to speak to the health care provider about the proper dosage first and follow instructions carefully. This is because very little iron is excreted from the body; iron can accumulate in body tissues and organs when the normal storage sites, the liver, spleen, and bone marrow are full. Although iron toxicity from food sources is rare, deadly overdoses are possible with supplements. According to Michael et al (2008), exhausted iron stores, this depletion results in restricted haemoglobin synthesis and then lastly, the overt iron deficiency which leads to anaemia resulting in decreased circulating haemoglobin. The cells become pale, small though haemoglobin concentration varies from individual to individual.

The Effect of Iron Deficiency

Michael and Agneta (2008) further state that iron deficiency happens when a body has not enough (or not qualitatively enough) iron to supply its eventual needs. Iron is present in all cells in the human body and has several vital functions, such as: carrying oxygen to the tissues from the lungs as a key component of the haemoglobin protein; acting as a transport medium for electrons within the cells in the form of cytochromes; facilitating oxygen enzyme reactions in various tissues. Too little iron can interfere with these vital functions and lead to morbidity and death. Total body iron averages approximately 3.8 g in men and 2.3 g in women. In blood plasma, iron is carried tightly bound to the protein transferrin (Michael et al, 2008).

According to Nelson, Bakalion, and Trivedi (1994), girls with an iron deficiency may experience these symptoms: hunger for strange substances such as paper, ice, or dirt (a condition called pica); upward curvature of the nails, referred to as koilonychias and soreness of the mouth with cracks at the corners. Pica is a well-known manifestation of iron deficiency from which individuals recover soon after the start of iron therapy (Pynaert, Matthys, Bellemans and DeMaeyer, Dettenauw and De Backer, 2005). Iron deficiency is considered to be the commonest of nutritional deficiencies worldwide. However, the situation is most prevalent in developing countries of which Zimbabwe is part of. Adverse effects are stated to include lower growth rate and impaired cognitive scores in children and poor pregnancy outcome and lower working capacity in adults. Michael and Agneta (2008) claim that girls that receive iron for iron-deficiency anaemia commonly report improved memory, attention, mood, and energy before any improvement in haemoglobin indices. According to Nelson et al (1994), decreased brain iron stores may impair the activity of iron-dependent enzymes necessary for the synthesis, function, and degradation of neurotransmitters, such as dopamine, serotonin, and noradrenalin. Alexander and Walker (2006) report that during the past ten years, the increased use of iron-fortified formulas and cereals has improved the iron status of children and reduced the prevalence of iron-deficiency anaemia. However, adolescent girls and young women are still at high risk of developing iron deficiency because of increased iron demands during puberty, menstrual losses, accelerated growth and limited dietary iron intake (Cook and Finch, 2007). Cells that are rapidly dividing are acutely sensitive to iron deficiency, that is, red blood cells which may not be active in carrying oxygen from the lungs to the body.

Michael and Agneta (2008) state that red blood cells (RBCs), also called erythrocytes, are the most common type of blood cell and the vertebrate's principal means of delivering oxygen (O_2) to the body tissues via blood flow through the circulatory system. RBCs take up oxygen in the lungs, or gills of fish, and release it into tissues while squeezing through the body's capillaries. World Health Organization (WHO, 2008) regards iron deficiency as the commonest of deficiency diseases worldwide. In children, disadvantages range from lower growth rate to impaired cognitive development; while in adults poor pregnancy outcome and lower work capacity may be found (Ahmed, Kham, Islam, Kabir and Fuchs, 2000).

The associated ill-effects have been described as ‘devastating’ and, in some contexts, as ‘irreversible’ (Michael and Agneta, 2008). Because of the universal commonness of the deficiency it would be expected that there would be ample data, past and updated, in Zimbabwe. It is important to note that Iron depletion can occur in all age groups and sexes but it is more critical in teenagers and expectant mothers. In teenagers, no clinical symptoms that can be used as an indicator for diagnosis, failure to address the problem can result into severe effects on health as mentioned earlier, impaired cognitive development, immune function as well as disturbances in energy metabolism which eventually leads to anaemia (WHO, 2008).

Sources of Iron

DuBois and David (2005) highlight the sources of iron in both vegetarian and non-vegetarian foods, which are classified as heme or non-heme respectively. Legumes, lentils, soyabeans, whole grains, green leafy vegetables, cereals, bread, spinach, turnip, sprouts, broccoli, and dry fruits also have good iron content. Iron can also be acquired in tablets and supplements. Anaemic patients are often advised by doctors to take

supplementary tablets or tonics. Marx (1997) argues that food items containing good levels of vitamin C may also aid in the absorption of iron by the body. For example, eating a burger with tomato slices on it could boost the absorption of non-heme iron contents from the burger bread. Citrus fruits and juices like orange juice may also help in its absorption. Dietary intake is a major source of iron into the body but some is inhibited its absorption by other dietary factors and other nutrients.

Paret (2003) affirms that in African tradition, women are responsible for planning and preparing family meals, with their knowledge of nutrition or lack of it can affect the entire family by not including the relevant food sources of different nutrients especially in the case of iron inclusion. Major sources of iron include- spinach, meat, fish, chicken, egg yolk, oysters and artichokes'. According to DuBois and David (2005) spinach may not provide superhuman strength to fight off villains like Popeye's nemesis Bluto, but this leafy green and other foods containing iron can help fight iron-deficiency anaemia. Without sufficient iron, the body cannot produce enough haemoglobin, a substance in red blood cells that makes it possible for them to carry oxygen to the body's tissues which may result in feeling weak, tired, and irritable.

Marx (1997) discovers fish as low-fat high quality protein which is filled with omega-3 fatty acids and vitamins such as D and B2 (riboflavin). Nelson, Bakalion, and Trivedi (1994) illustrate that fatty acids required for biological processes but does not include the fats that only act as fuel. Marx (1997) describes vitamin D as a group of fat-soluble secosteroids responsible for increasing intestinal absorption of calcium, magnesium, and phosphate, and multiple other biological effects. Nelson et al (1994) describe vitamin B2 as part of an enzyme needed for energy metabolism; important for normal vision and skin health which include milk and milk products; leafy green vegetables; whole-grain, enriched breads and cereals. It was also discovered that fish is rich in calcium and phosphorus and a great source of minerals, such as iron, zinc, iodine, magnesium, and potassium. The American Heart Association recommends eating fish at least two times per week as part of a healthy diet (Marx, 1997). Fish is packed with protein, vitamins, and nutrients that can lower blood pressure and help reduce the risk of a heart attack or stroke and contribute protein, minerals, vitamins and fat, and these nutrients which are important for the beneficial effects of the well-being. Michael et al (2008) say that meat, such as saturated fats, can confer negative health consequences. It is important to understand how meat can affect the overall health which can help to make positive choices when selecting foods for daily diet.

In another study by Nelson et al (1994) consider chicken as often cited to be a healthy food for both general health and dieting, as it is rich in protein and provides minimal fat. In addition to these characteristics, chicken also offers a number of micronutrients vitamins and minerals including iron. While many other foods contain iron, chicken also has other beneficial nutrients that may make it a good choice for your diet. Chicken provides other important nutrients in addition to iron. These nutrients include zinc, potassium, choline and vitamin A. A typical 3.5-oz.chicken breast provides 165 calories, with 31 g of protein, 3.6 g of fat and no carbohydrates (Nelson et al, 1994).

Michael and Agneta (2008) find that about 20% of women, 50% of pregnant women, and 3% of men do not have enough iron in their body. The solution, in many cases, is to consume more foods high in iron. These provide heme-iron a type easily absorbed and not affected by medication or other factors. Non-heme sources include lentils, beans; leafy vegetables such as spinach contain oxalase which bind iron, fortified bread and cereals. This type of iron is not readily absorbed by the body. Nelson et al (1994) point out that using iron skillet allows iron to be absorbed by the food, though length of cooking is a major determinant of the degree of absorption. It is for this reason that the use of iron cook wear has increased and some international organisation have taken it upon themselves to distribute iron cookware to high risk population in developing countries in an effort to reduce the prevalence of iron deficiency.

Factors Influencing Iron Absorption

Nelson et al (1994) state that the absorption of heme iron (from meat and animal products) isn't generally affected by diet; however, the body's absorption of non-heme iron (from plant sources) can vary depending on other items you eat or drink. For example, orange juice or other foods that contain vitamin C can help the body to absorb non-heme iron more easily if they're eaten at the same time. On the other hand, coffee, tea and a variety of other items can reduce the amount of iron your body is able to absorb. Other foods that inhibit iron absorption include wheat germ, whole wheat flour, lentils and dark green vegetables.

Marx (1997) states that the heme- iron from animal sources is readily absorbed, for example, high meat consumption and high intake of ascorbic acid as well as copper increases the absorption of non-heme iron which is usually affected in its absorption by nutrients such as calcium. Michael and Agneta (2008) point that iron in animal foods is often attached to proteins called heme proteins, and referred to as heme iron. In plant foods, iron is not attached to heme proteins and is classified as non-heme iron. Heme iron is typically absorbed at a rate of 7-35%. Non-heme iron is typically absorbed at a rate of 2-20%. Insufficient iron intake, malabsorption and increased iron losses can deplete iron stores in the body (Pynaert, 2005). Scott and Prtchard (1997) report that insufficient iron intake causes health problem such as anaemia which is a serious health condition.

Signs and Symptoms of Iron Deficiency

According to Pynaert (2057), signs and symptoms of iron deficiency can be experienced even before the deficiency has progressed. These include, fatigue, dizziness, hair loss, general body weakness, reduced, work capacity and decreased resistance to infection. These symptoms are caused by chronic bleeding where a lot of haemoglobin is lost, excessive menstrual bleeding, inadequate intake in the diet, and blood loss through blood donation, injury, gastrointestinal cancer and frequent use of aspirin. In the other hand, athletes lose iron through sweat and urine though in small amounts. So long distance athletes need adequate iron for endurance.

Teenage Stage and Iron intake

Steinberg (2008) describes teenage stage as a transitional stage of physical and psychological development that generally occurs during the period from puberty to legal adulthood ranging from 13-19 years. At this stage the girls become physical mature making them capable of sexual reproduction of children. The biological clock starts a series of major changes physically, emotionally and psychologically (Musoki and Chikwava, 2016). The girls may be negatively affected in selecting the appropriate type of foods to consume. Steinberg (2008) argues that girls begin to be shy to eat food. This is also the time when girls begin to get into relationships which may negatively affect their choice of food to consume. Nutrient requirement increases at this stage especially iron as it plays a major role in their well-being (Denis, 2011) It is at this stage that peer pressure come into play influencing to a larger extent eating patterns and habits, which may exclude iron rich foods in preference to 'junk' foods with very little to meet their nutritional need.

The physical changes taking place should be supported by an adequate diet that supply the necessary nutrients needed by the body to stay healthy. Steinberg (2008) further argues that under nutrition or lack of important micro and macro nutrients have severe health consequences of which iron depletion leading to anaemia is one of them. According to Pynaert et al (2005) micronutrients are vitamins and minerals; on minerals are flouride, selenium, sodium, iodine, copper and zinc and on vitamins are vitamin C, A, D, E and K, as well as the B-complex vitamins.

Pynaert et al (2005) further highlight the significance of micronutrients to the proper functioning of all of the body's systems. Sodium, for instance, is responsible for maintaining the proper fluid balance in the body; and helps fluids pass through cell walls and helps regulate appropriate pH levels in the blood. Rosenberg (1986) discovers that micronutrient deficiency can lead to some serious health problems. WHO (2008) feels that micronutrient deficiency presents a huge threat to the health of the world's population. Some common micronutrient deficiencies include iodine deficiency, vitamin A deficiency and iron deficiency. Pynaert et al (2005) view macronutrients as nutrients that provide calories or energy to the body and maintaining the body and contribute to the taste, texture and appearance of foods, which helps to make the diet more varied and enjoyable.

The Benefits of Iron Intake in the Body

Michael et al (2008) stress that health benefits of iron relate to a proper growth of human body and maintenance of robust health. It is an essential protein component for metabolism, and the human body needs it to produce red blood cells. It was discovered that the human body is capable of preserving up to 25% of it for future use, especially in the cases of inadequate diet intake, which is a backup plan for reducing the impact of anaemia, if its intake suddenly declines. Peter (2010) finds that human body contains about 70% of iron which is found in haemoglobin and myoglobin. Haemoglobin is the primary transporter of oxygen from the lungs to the body's tissues, while myoglobin is in muscle cells, and makes acceptance, storage, transportation, and release of oxygen possible in those cells. Subsequently, John (2011) finds that 25% of the body's iron is stored in ferritin, which is present in the cells. Ferritin can store up to three years' worth of iron supplementation for men, but only about one year's worth for women, which is why anaemia is more common in females.

Allender and Waker (2006) describes ferritin as a universal intracellular protein that stores iron and releases it in a controlled fashion. The protein is produced by almost all living organisms, including algae, bacteria, higher plants, and animals. In humans, it acts as a buffer against iron deficiency and iron overload. Ferritin is found in most tissues as a cytosolic protein, but small amounts are secreted into the serum where it functions as an iron carrier. Denzel (2011) highlights the following as benefits of iron intake in the body; boosts hemoglobin Formation, improves muscle function, increases brain function, treats restless leg, regulates body temperature, oxygen, treats anaemia, cures chronic diseases, treats anaemia in women and eliminates fatigue

The Consequences of Anaemia

John (2011) considers anaemia as a condition that results when girls do not have enough red blood cells. There can be many effects of anaemia, ranging from mild, short-term symptoms like fatigue and pale skin, to longer-term, more severe complications such as heart failure. Ahmed et al (2000) observe that anaemia may be caused by blood loss due to surgery or, in women and heavy menstrual periods. Dennis (2005) argues that the effects of anaemia usually relate to how low the level of red blood cells gets in the body, rather than the exact cause of the anaemia. When red blood cells are just below normal levels in a mild case of anaemia, there may actually be no visible effects. The lower red blood cell levels get, however, the more pronounced the effects of anaemia may become. These may include feeling fatigued, short of breath, dizzy or confused. A person may also showcase pale skin and cold extremities, and suffer from headaches and chest pain (Paret, 2013). Dennis (2005) state that when the amount of red blood cells gets very low or low levels go untreated for a long time, the effects of anaemia can be severe which can sometimes lead to an irregular heartbeat, called an arrhythmia that can damage the heart muscle over time. Alexander and Waker (2006) also argue that in severe cases, this can lead to heart failure and other organ damage, which can sometimes be fatal. It may also make other health conditions a person has worse, which may lead to a variety of complications. Treatments are often recommended to help resolve the effects of anaemia and prevent long-term damage to the body. Schemer (2009) argues that the exact treatment used typically depends on the cause of the anaemia. For example, in cases of dietary deficiencies, supplements and dietary modifications may be recommended. If the anaemia is being caused by loss of blood, health-care providers will usually take steps to help stop the blood loss. Other treatments may include blood transfusions, hormone supplements and other medications to treat any comorbid health problems that may be contributing to the low red blood cell level.

III. Methodology

Research Design

The study used qualitative method to collect data from the selected participants. According to Newman (2011), qualitative method facilitates easier collection of perspectives from different people and provides the opportunity to develop a rich understanding, descriptive and perception into the subject's or individual's lifestyles, beliefs, concerns, aspirations, and culture. The study used interview guide and 3-day food record to collect data from participants. The data were manually analysed.

The Study Population

Kennedy (2009) defines population as a complete set of elements (persons or objects) that possess some common characteristic defined by the sampling criteria established by the researcher which is composed of two groups - target population and accessible population. The study population involved all the 161 form two girls at Dzivaresekwa 2 High School where 80 of them were chosen to participate in the study.

Sampling Technique

Purposive and convenient sampling techniques were used in the study. In purposive sampling, the researcher employed his own "expert" judgment about who to include in the sample frame. That means that participants were selected due to certain characteristics and it was also convenient to the researcher to include the form two girls at Dzivarasekwa 2 High School.

Sample Size

80 form two girls whose age ranges from 12-16 years were selected to participate in the study. The numbers were generated from 1 to 161 and were placed in a hat to allow participants to pick. The participants that picked the product of 2 were selected to participate in the study.

Data Analysis

The content analysis was used to analyze the qualitative data.

Ethical and Legal Considerations

Newman (2011) describes ethical issues as concerns, dilemmas and conflicts that arise over the proper way to conduct research. The researcher made sure that no psychological, social, physical, legal or other risks anticipated in the study. According to King (2010), the following salient points, among others, were born in mind by the researcher in undertaking the study;

i. Protecting the Rights of the Participants

Through observing confidentiality, anonymity and privacy and informed consent. No information was linked to the participants. The researcher also emphasised that participation was voluntary and that participants were free to withdraw from the study at anytime should they wish to do so**.**

ii. Scientific Integrity of the Research

The researcher protected the body of scientific knowledge by ensuring that the sources are well acknowledged.

IV. Findings

Iron Rich Foods Consumed by Form Two Girls at Dzivarasekwa 2 High School

The study found that the participants consumed the following type of foods;

- Though the majority of participants consumed junk foods, the study found that few participants consumed iron rich foods during their breakfast, lunch and supper such as; soybeans, bread, green leafy vegetables, spinach, meat, fish, cereals and whole wheat.
- The consumption of iron rich foods by participants were limited because most of their parents are not formally employed hence struggling to make ends meet.

Frequency of Consumption of Iron Giving Foods in the Diet of Form 2 Girls at Dzivarasekwa 2 High School

The information provided by participants in the 3-day food record showed that;

- The majority of participants (80%) consumed junk foods which lacked iron and balanced diet.
- During the school days, the study found that majority of participants (80%) consumed junk food during their lunch time.
- The study found that 32 % of participants did not get all the three meals per day.
- The results indicated that 62% of participants got two meals per day while 6% of participants survived in one meal per day.
- 35% of participants consumed descent meals containing iron giving foods during the supper time
- Iron giving foods were lacking in the meals consumed by majority of participants.

Factors Influencing Iron Intake by Form Two Girls at Dzivarasekwa 2 High School

The results showed that the iron intake by form two girls at Dzivarasekwa 2 High School was influenced by the following factors;

- The majority of participants (80%) were coming from an average of 6 family members.
- The majority of participant's (75%) parents and guardians were not formally employed, which negatively affect their affordability to purchase iron giving foods.
- The study found that 30 % of participants were staying with relatives suffering from anaemia.
- The results also indicated that 65% of participants had little knowledge on iron giving foods that negatively affect their choice and consumption.
- The results also showed that 57% of participants indicated that peer influence contributed to their choice of food consumption.
- Interestingly, the study found that most participants' parents and guardians were prioritising saving their monies to pay school fees for their children in the expense of purchasing iron giving foods.

V. Discussion

Iron is an important component of haemoglobin, the substance in red blood cells that carries oxygen from the lungs to transport it throughout the body. Haemoglobin represents about two-thirds of the body's iron. If the body has inadequate iron, the body cannot make enough healthy oxygen-carrying red blood cells. Lack of red blood cells is called iron deficiency anaemia. Iron is obtained from iron rich foods that are consumed and from the breakdown of red blood cells in the body. When the diet lacks iron, the body uses its stored iron to meet needs. When these reserves get depleted, haemoglobin levels decrease and over time a person develops iron deficiency anaemia (IDA). However, the best sources of iron are obtained from iron fortified cereals, chicken and chicken liver, lean red meat, dried beans and legumes, clams, oysters, leafy greens, nuts and whole grains. Heme iron is obtained from animal sources and non heme iron is obtained from plant sources. Heme iron is better absorbed than non heme iron in the body.

Although iron deficiency anaemia is the most common nutritional deficiency worldwide, the health effects of iron overload merit increased attention. The public health interventions such as fortification and enrichment of foods with iron should be undertaken to reduce the prevalence of iron deficiency anaemia and improve health among the form two girls at Dzivarasekwa 2 High School. These measures, along with iron supplementation, remain controversial, because additional exposure to dietary iron places expose some segments of the population at increased risk of iron excess. The health consequences of unmistakable iron excess are exemplified by hemochromatosis, an iron storage disease associated with liver damage further

exacerbated by alcohol consumption. Progressive liver damage associated with this condition is generally attributed to increased oxidative stress. In otherwise healthy individuals, more modest levels of iron storage may occur if iron is provided by supplements or otherwise added to the food supply. Increased iron intake and storage have been linked to a variety of chronic diseases.

Health is the fundamental right to everyone. As a result, there is need to ensure that the young girls are healthy considering the types of food they eat. WHO (1968) defines health as not merely the absence of disease but as a state of physically, mentally, socially and wellbeing. When the young girls are affected by anaemia which is caused by iron deficiency, their parents/guardians suffer a lot. This is mostly likely to force parents/guardians to hunt for money to cover medical expenses; which may negatively affect the girls as they might miss school classes.

Based on the findings in the study, the majority of participants (80%) consumed junk food which is not health for the participants. It was noted the type of food consumed by the participants are determinants of health which should a fundamental right to everyone. When individuals are sick from any other different types of diseases and fail to consume iron giving foods, becomes vulnerable to opportunistic infections which can worsens the health condition. Opportunistic infection is the moment when the immune system is completely weakened or destroyed and no longer able to effectively fight off any micro-organisms causing diseases.

The study indicated that participants were willing to eat iron giving foods to prevent anaemia but their parents and guardians were not formally employed. Interestingly the majority of participant's parents and guardians are dedicated and committed to send their children to school.

VI. Recommendations

The study recommended the following;

Feeding Program – the government should also extend feeding program in Secondary Schools maybe for the exception of boarding schools.

Identification of the girls need help – the young girls whose parents cannot afford to provide adequate food, need to be identified and get assistance from the government or social welfare.

Teachers – teachers to conduct meetings with participant's parents to discuss the significance of consuming iron giving foods.

School Responsibility - there must be a provision of nutrition education on anaemia and iron supplementation, which requires the inclusion of nutrition sessions in the classes, preparation of educational materials, establishment of nutrition clubs and presentations in the mini media.

Donors and well-wishers – the school authority through the Ministry of Education to approach donors and well-wishers that if willing; assist the struggling participants with food hampers.

Job Creation – the government should to create jobs opportunities for the people as strategy to alleviate poverty.

References

[1] Alexander, R, and Walker, P. (2006). The Remedying of Iron Deficiency: What Priority should it Have? British Journal of Nutrition 72 (14): 427-433.

[2] Alton, M.I. (1996). Becoming a Woman: Nutrition in Adolescents: In: Krummel DA, Kris-Etherton, eds. Nutrition in Women Health, Gaithersburg. MD: Aspen Publishers

[3] Al-Mekhlafi, M; Johari, S; Atiya, A.S; Ariffin, W.A; Mohammed, A.K; and Che-Abdullah, H. (2008). Anaemia and Iron Deficiency: Anaemia Among Aboriginal Schoolchildren in Rural Peninsular, Malaysia. An Update on a Continuing Problem. Transaction of the Royal Society of Tropical Medicine and Hygiene 102 (7): 1046-1052

[4] Ahmed, F; Khan, M.R; Islam, M; Kabir, I; and Fuchs, G.J. (2000). Anaemia and Iron Deficiency Among Adolescent Schoolgirls in Peri-Urban Bangladesh. European Journal of Clinical Nutrition, 54(11): 678-683.

[5] Cook, J, and Finch, C. (2007). Assessing Iron Status of a Population. *American Journal Clinical Nutrition*; 32 (6): 2115–2119.

[6] Dallman, P. R. (2002). Manifestations of Iron Deficiency. British Journal of Nutrition 19 (9)**:** 19–30.

[7] Denis, T. (2011). Iron Deficiency in Albinos. British Journal of Nutrition 25 (27): 111-125

[8] Denzel, M. (2011). The Effect of Anaemia in Pregnant Women: *The British Journal of Nutrition 22(19): 234-247*

[9] DuBois, S, and David, J.K. (2005). Iron-Deficiency Anemia and Hclicobacter Pylori Infection. A Review of the Evidence. *American Journal of Gastoenterology, 100 (4): 453-459.*

[10] John, E. (2011). The Consequences of Anaemia in Adolescent. A Case of Mtalieu, Indiana: *International Journal of Health and Well-being 5(24): 211-222*

[11] Kennedy, P. (2009). How to Combine Multiple Research Methods, Practical Triangulation**,** Johny Holland.

[12] Loreto, D. (2010). The Causes and Effects of Anaemia in Developing Countries. *British Journal of Nutrition, 51(12): 1231-1243*

[13] Marx, J.J.M. (1997). Iron Deficiency in Developed Countries: Prevalence, Influence of Lifestyle Factors and Hazards of Prevention. *European Jouranl of Clinical Nutrition, 51(12): 491-494.*

[14] Michael, H, and Agneta, S. (2008). Iron Status in Swedish Teenage Girls: Impact of Low Dietary Iron Bioavailability. *British Journal of Nutrition, 24 (8): 638-645.*

[15] Michael, N; White, J; and Rhodes, C. (2008). Haemoglobin, Ferritin and Iron Intakes in British Children Aged 12-14 Years: A Preliminary Investigation. *British Journal of Nutrition, 70(10): 147-155.*

[16] Musoki, T. and Chikwava, G. (2016).The Cultural Values and Norms of Zimbabwe. Sage Publication.

[17] Newman, W.L. (2011). Social Research Methods: Qualitative and Quantitative Approaches (7th Edition). PEARSON. University of Wisconsin at Whitewater
[18] Nelson, M; Bakalion, F; and Trivedi, A. (1994). Iron Deficiency Anaemia and Physical Performance in Adolescent Girls from Different Ethnic Backgrounds. British Journal of Nutrition, 27 (12): 427-433.
[19] Paret, T.M. (2003). The Benefits of Consuming Balanced Diet. European Journal of Clinical Nutrition, 61(9): 911-925
[20] Peter, C. (2010). Iron Intake and Dietary Sources of Iron in Indian Teenagers. British Journal of Nutrition, 21 (6): 777-789
[21] Pynaert, I; Matthys, C; Bellemans, M; De Maeyer, M; De Henauw, S; and De Backer, G. (2005). Iron Intake and Dietary Sources of Iron in Denish Adolescents. European Journal of Clinical Nutrition, 59(7): 826-834.
[22] Steinberg, L. (2008). Adolescence, 8th ed. 273. New York, NY: McGraw-Hill.
[23] Scott, D, and Pritchard, J.A. (1997). Iron Deficiency in Healthy Young College Women. *JAMA*; 199 (5)**:** 897–900.
[24] Soekarjo, D.D; Delee, S; and Kusin, J.A. (2004). Effectiveness of Weekly Vitamin A (10000IU) and Iron (60mg) Supplementation for Adolescents Boys and Girls Through Schools in Rural and Urban East Java Indonesia. European Journal of Clinical Nutrition, 58 (11): 927-937.
[25] World Health Organisation (WHO), (2008). Report on the Nutrient Food, Geneva

Clever Marisa"An Investigation of Iron Intake of Form Two Girls at Dzivarasekwa 2 High School in Harare. "IOSR Journal of Business and Management (IOSR-JBM) 20.4 (2018): 76-84