

## CHAPTER 1

### INTRODUCTION

Cereal grains constitute the least expensive high carbohydrate diets, which are the most important source of energy for much of the world's population (FAO, 1997). Cereals are important in the diet for preventing undernutrition and to help prevent and treat diseases of overnutrition (Vorster and Venter, 1993). Whole-grain cereals prevent undernutrition by being an inexpensive, nutrient-dense source of energy, plant protein, starch, dietary fibre, polyunsaturated fat, a variety of vitamins, minerals, trace elements and electrolytes (Vorster and Venter, 1993). The role of cereals in preventing diseases of overnutrition, is more complex. In unrefined foods, the presence of fibre is likely to slow carbohydrate absorption by interfering with the digestion of starch or other saccharides. Also, plant cell walls or bran layers in cereal grains can serve as a barrier to the penetration of digestive enzymes (Schneeman and Tietyen, 1994).

Dietary carbohydrates are digested and absorbed at different rates and to different extents in the human small intestine, depending on their botanical source and physical form of the food (Englyst, Englyst, Hudson, Cole and Cummings, 1999). It has been suggested that diets that contain large amounts of rapidly digested carbohydrates, which elevate blood glucose and insulin responses, may be detrimental to health. Carbohydrates may directly influence human diseases by affecting physiological and metabolic processes (FAO, 1997). One of the diseases of metabolic disorder that is associated with dietary risk factors is non-insulin dependent diabetes mellitus (National Research Council, 1989; Reviewed by Feskens, 1992; FAO, 1997).

According to Cahill, Arky and Perlman (1991), Anderson and Geil (1994), Anderson and Deskins (1995), diabetes mellitus (DM) is a chronic metabolic condition characterized by major derangements in metabolism of glucose which results in inappropriate hyperglycaemia, and abnormalities in metabolism of fat, protein, and other substances. Non-insulin dependent diabetes mellitus (NIDDM or Type II) is the most dominant type

of diabetes mellitus, occurring in the mid-adulthood and constituting to about 85 to 90% of all the diabetic cases, of which 90 to 95 percent are normally overweight. According to FAO (1997) high rates of NIDDM in all population groups are associated with cultural changes in populations previously consuming traditional diets which were unrefined, and also with increasing obesity. Foods rich in dietary fibre and carbohydrate-containing foods with slower starch digestibility or low Glycaemic Index (GI) appear to protect against diabetes, the effect being independent of body mass index.

During recent years, Tanzania has been experiencing an increase in the incidence of diabetes. The mostly affected people are among the employees of the middle and high incomes and prosperous business people who had moved from rural to urban and peri-urban areas (personal experience).

In the rural areas, maize, sorghum and pearl millet are ground to whole-grain flours, sometimes maize is mixed with sorghum to improve food palatability (Kundi, 1999). Mechanical dehuller/decorticator for rice and maize are located in urban and peri-urban areas (personal experience). Sorghum and millet are mainly consumed in the rural areas whereas urban dwellers are said to prefer maize (Hammond and Shayo, 1999; Shayo, Laswai and Kundi, 1999). In many parts of Tanzania, when people move from rural to urban areas they change from eating stiff porridges prepared from unrefined flours of maize, sorghum and pearl millet to stiff porridge prepared from refined flour of maize.

This study will try to find out if changes in eating patterns which follow after migrating from rural to urban areas implies changing from slowly digested stiff porridge to faster digested stiff porridge. A method of determining *in vitro* starch digestibility will be employed and will examine the effect of species (maize, sorghum and pearl millet), variety and refinement on the rate of starch digestibility. The outcomes of this study will provide more understanding on the rates of *in vitro* starch digestibility of the stiff porridges made from the three cereals, because there are significant number of people who believe that sorghum and pearl millet are slowly digested starchy foods, and therefore, can be used as therapeutic diet in diabetes management (personal experience).