

THE FOOD CARB COUNTING GUIDE

ESTIMATED CARBOHYDRATE CONTENT OF
THE COMMON FOODS IN UGANDA



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LIST OF CONTENT

FOREWORD

PREFACE

LIST OF REVIEWERS

INTRODUCTION

THE CHART

REFERENCE MATERIAL



FOREWORD

Why carbohydrate (Carb) counting?

There are many answers to this query. The most important is that carb counting contributes towards achieving appropriate glycaemic control, which has been shown to prevent or at least delay complications in both type 1 and type 2 diabetes – drawing the evidence from studies like the Diabetes Complications Control Trial (DCCT), the United Kingdom Prospective Diabetes Study (UKPDS) and other similar studies. Even before the discovery of insulin, early meal planning techniques focused on restricting carbohydrate intake. Moreover in the recent years our understanding of carbohydrates and diabetes in general has improved. The formulas of carbohydrate intake are now simplified to the simple three basics of: (i) knowing the amount of energy (Calories) required daily, (ii) the format it will be given (as fat, carbohydrate or protein) and (iii) the

way it will be presented for eating (food - which will include the other elements, water and vitamins).

It is now clear that carbohydrate has the largest impact on blood glucose concentrations (levels). All carbohydrates, not only sugars, have the potential to do this.

Although tools and aids for carb counting are now easily available, one should note that tools and aids are a means and not a method. Like having a hammer and a saw does not necessarily make one a builder; having the tools of carb counting does not automatically improve blood glucose; carb counting must be used within a comprehensive diabetes management plan.

There has been very few studies done on the Ugandan foods and this chart is among the first to be publicly available for use in carb counting. The foods

selected are not exhaustive and the chart does not go into the depth of the various cuisines of the Ugandan foods, but it is a good start to carb counting. It is hoped that this chart will act as a stimulant and catalyst for more in-depth work in the Ugandan foods. The chart should be an encouragement for persons with diabetes to learn more about the Ugandan food values and thus improve their choices in meal planning. We hope that with time, this chart will be a wonderful, practical, step-by-step guide to using carbohydrate counting in Uganda for the Ugandan cuisines.

DR. SILVER BAHENDEKA, MD

PREFACE

There have been concerns raised among various persons living with diabetes and care providers regarding achieving variety and quantity within meals without compromising their health status, especially in the context of the locally available and common foods in Uganda. Many have gone from desiring, to envying the lives of their normal counterparts whom they admire in the way they enjoy their choices not only in meals but also their physical and active lives. In trying to address such concerns, this chart has been designed as a stepping stone in coming to a development that shall also seek to address many of the future concerns. The common and various forms of carbohydrate-containing foods that make up most of the diets of Ugandans

were mapped, and analysed for approximate carbohydrate and Calorie content using a number of methods and materials. The materials included the Food Composition Tables (FAO FCT for use in Africa, East African FCT, Tanzania FCT, Uganda Nutri-Guide system, and FCT for East & Central Uganda), and

analysis

software (USDA Nutrient Data Lab, Nutri-Survey, ADA MyFoodAdvisor and Carb-Counter). The consultation of these materials and methods gave respective close estimates of portion sizes, carbohydrate content and calorie content of the analysed foods as are seen in the chart. Portion size descriptions have been only used in this version of the material and we believe users will find it practical and be able to easily adapt to it throughout their daily practice. The Glycaemic index classifications of the various foods have also been included.

This material has been reviewed by experts within and outside Uganda to whom I extend my thanks for their invaluable input. We therefore believe this guide shall serve to ensure nutritional well-being for persons living with diabetes while empowering them with liberal choices regarding their meals, medical therapy and physical activity.

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INTRODUCTION

A healthy eating plan is an essential component of diabetes care - whether or not one is taking blood-glucose-lowering medications (like insulin or tablets) or other medications to control blood pressure, blood lipids and more. However, hands down, healthy eating day after day is the most difficult and challenging part of taking care of diabetes, especially today in the fast-paced convenience-driven world.

This chart has been designed to give an estimate of the carbohydrate content of common foods in Uganda. The chart should be used in the planning of meals suitable for persons with diabetes so as to empower them with choices regarding variety, quantity, and exchange during meal planning.

Most of the carbohydrates we eat come from starchy foods, legumes, fruits and milk.

Vegetables contain fewer amounts of carbohydrate while amounts of carbohydrate in meats are not significant. It is important to note that the effect of carbohydrate-containing foods on the blood glucose levels is also influenced by the glycaemic indices of the respective foods.

Carb counting is not a one-size-fits all meal planning method. It is simply a method to help in planning a balanced meal so as to control blood glucose levels along with other elements of the diabetes care plan, such as medications, and exercise. The meals should also be tailored to therapy in terms quantity and timing.

Defining key words

Quantity:



amount of food you are ready to eat at a given time.

Variety:

the various types of food you are ready to eat at a given meal.

Food exchange:

a given food replaced by another in a meal. In this case both foods should contain similar quantities of carbohydrate.

Carbohydrate count :

gives the amount of carbohydrate (in grams) in a given quantity or piece of a food. Changing the natural form of a food, often affects the amount of carbohydrate in it significantly.

Carbohydrate count can be shown as *Carbs*, where 1 *Carb* is equivalent to 15g of carbohydrate.

Glycaemic index :

shows how glucose from different foods would behave in blood by

either causing an immediate rise and fall or a consistent and extended rise and fall. The different types of foods are compared with the effect of pure glucose, which has the highest score (of 100) and causes very immediate rise and fall of blood glucose levels

when swallowed.

Calorie content: amount of energy (calories) our body receives from a given amount of food.

THE HEALTHY DIET CHOICE



Below is an illustration of a general simplified plate with the carbohydrate content for each serving listed. Illustration of the 'plate' may differ depending on the meal i.e. an illustration for breakfast differs from that for lunch/dinner, and also plate illustration for infants differs from adults'. The reason behind the ½ plate vegetable-cover is the very low carbohydrate content of vegetables that gives an overall low carbohydrate load for the meal. For optimal health and

quality of life however, other nutrient needs in addition to carbohydrates should also be given consideration in persons with diabetes.



THE CHART

The Chart has five columns in which the selected foods along with their carbohydrate and calorie contents are shown. The carbohydrate content in every food is shown in grams (g), and calorie content shown in Calories (Cal). The foods have been grouped under: 'Starches', 'Fruits', 'Milk and Milk products', 'Pulses, Nuts and Legumes', 'Vegetables', and the 'Miscellaneous'.

Column 1: Food images/pictures

The images of foods shown in this chart were: (i) taken by camera, (ii) images from <http://www.pachd.com/free-images/>.

The images help to recognise each food shown in the chart.

Column 2: Form/Nature of food

Different ways of how food may be changed before we eat it have been shown with the respective carbohydrate content and GI for every food form.

Column 3: Quantity/Amount of Food

There are different ways of knowing the amount of food we eat that may include, weighing the food, using hands (fingers, palms, fists), and using utensils in the home (like cups, plates, dishes, spoons, drinking glasses). Food portion descriptions have been used in this column rather than the grams of food portions.

Column 4: Carbohydrate Content (Carb-Count)

The carbohydrate content in every food has been shown in grams (g). The carbohydrate figures shown in the chart are for available (net) carbohydrate in the food.

Glycaemic Index (GI)

This is also shown in column 4. How different foods affect our blood glucose levels is shown by arrows.

- ⤴ Low GI is shown by a Green arrow pointed downwards
↓
- ⤴ Medium GI is shown by an Orange double pointed horizontal arrow ↔
- ⤴ High GI is shown by a Red arrow pointed upwards ↓

Foods of low and medium glycaemic index are encouraged because they do not cause immediate rise and fall in blood glucose levels unlike the high GI foods.

Column 5: Calorie content

This shows the amount of energy that our body can get from the foods shown in the chart. The energy is shown as

Calories (Cal). The bigger the figure, the bigger the amount of energy in the food.

Useful Equivalent Estimates

For consideration, the following equivalent estimates apply to the chart:

- ⤴ 1 cup of a measure is equivalent to 250ml
- ⤴ 1 tbsp(table spoon) gives an equivalent of 3tsp(teaspoons)
- ⤴ For most Juices, the ratio of juice extract to water is usually 1:3
- ⤴ 1 Ladle serving is equivalent to ¼ (quarter)of a Cup





Cooked Porridges

For thick porridges (cannot easily pour off the spoon):



100g are equivalent to $\frac{1}{3}$ (third) of a Cup.

For thin porridges (usual consistency) (pours off the spoon fairly easily):

▲ 100g are equivalent to 100ml reading.

EP: Edible Portion size, shows the food size to be eaten (inedible part removed) e.g. Orange without peel
AP: All Portion size, shows the food piece that still has inedible part e.g. Potato with skin. Orange with peel

Symbols used:

„ ---- inches

cm ---centimetres

Utensils used for portion estimation



Cup



Teaspoon



Bowl



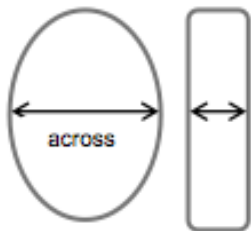
Tablespoon



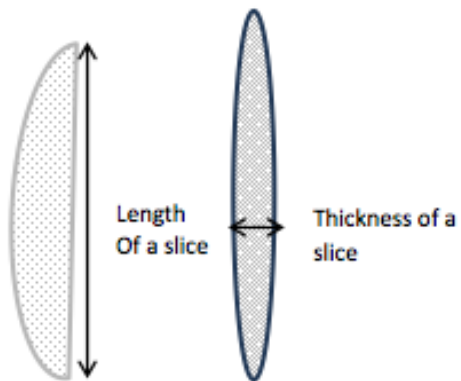
Ladle



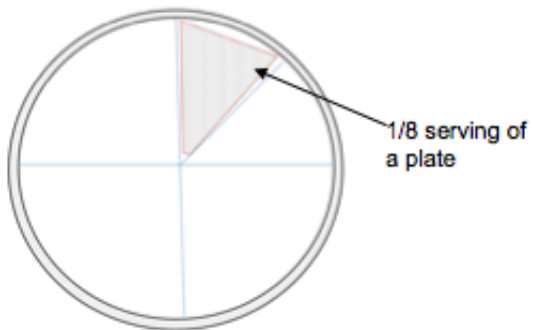
Plate



A whole fruit or food



Slice of food (e.g. pumpkin, melon, etc.)
Thickness measured from the back of slice



ILLUSTRATING WHAT DIMENSIONS USED IN THE CHART REPRESENT

For practice, a user of the chart may require the following:



- ⤴ A measuring cup or jar that is calibrated
- ⤴ A ruler to estimate length and or thickness
- ⤴ Teaspoons & Tablespoons
- ⤴ Usual home utensils (like plates, ladles, cups, spoons)

Note:




- ⤴ All highly refined foods (like table sugar, wheat, rice, maize flour) have a high glycaemic index whereas the same foods when unrefined have a low glycaemic index.
- ⤴ Foods cooked in peel (like potatoes, *matooke*, yams) have a glycaemic index lower than if the same foods were cooked when peeled.






STARCHES

FOOD	FORM/NATURE	QTY/AMT	CARB COUNT	CALORIE CONTENT
Green Banana/Plantain (<i>Matooke</i>) 	Cooked	1 AP finger abt 3cm across & 7" long Or An equivalent serving of mashed	30g ↔	116Cal
Cassava 	Boiled	slice: abt 6" long & 2" across	30g ↓	124Cal
	Fried	slice: abt 7" long & 3cm across	10g ↔	347Cal
	Cassava Porridge (no sugar)	1 Cup Thick	20g ↑	80Cal
		1 Cup Thin	15g ↑	60Cal
	Flour mingled (Cassava 'posho')	1" thick covering 1/8 of an 8" plate	40g ↑	188Cal
















Potato (Irish potato) 	Boiled	abt 2.5" across APyield or 2 egg-size potatoes	20g ↔	87Cal
	Chips (French fries)	1 heaped Ladle	15g ↓	236Cal
	Fried Crisps	3 heaped Ladles	45g ↔	528Cal
Sweet potato 	Boiled without skin	Abt 2.5" long & 4cm across	15g ↔	72Cal
	Boiled with skin	Abt 2.5" long & 4cm across	20g ↓	90Cal
	Peeled & Fried	3 potatoes (abt 4" long & 1" across)	20g ↔	130Cal
Yam 	Cooked	slice 4.5" long & 1.5" across	28g ↓	116Cal





<p>Cocoyam (Taro)</p> 	Cooked	slice 4.5" long & 1.5" across	30g ↓	124Cal
<p>Maize (Grade 1 flour)</p> 	Posho	serving 1" thick covering 1/8 of an 8" plate	35g ↑	172Cal
	Maize porridge (no sugar)	1 Cup Thick	20g ↑	96Cal
		1 Cup Thin	17g ↑	80Cal
<p>Corn on cob</p> 	Fresh cooked	1 cob (5" long & 4cm across) yield	50g ↓	220Cal
	Fresh roasted	Half of cob (7" long & 2" across) yield	75g ↓	357Cal






<p>Popcorn</p> 	Oil popped	8 heaped Ladles (2 heaped cups)	15g 	110Ca
<p>Finger millet</p> 	Millet porridge (no sugar)	1 Cup Thick	20g 	80Cal
1CupThin		15g 	64Cal	
Millet Bread (millet 'posho')	Serving 1" thick covering 1/8 of an 8" plate	30g 	142Cal	
	Fermented porridge	1 Cup	20g 	95Cal
<p>White Rice (Grade 1)</p> 	Rice flour mingled (stiff porridge)	Serving 1" thick covering 1/8 of an 8" plate	50g 	224Cal
Rice Porridge (no sugar)	1 Cup Thick	25g 	104Cal	
	1 Cup Thin	20g 	87Cal	
Rice boiled with oil	1 heaped Ladle	40g 	200Cal	
Rice boiled, no oil	1 heaped Ladle	35g 	160Cal	



Sorghum 	Sorghum 'posho'	Serving 1" thick covering 1/8 of an 8" plate	30g ↓	142Cal
	Sorghum porridge (no sugar)	1 Cup Thick	17g ↔	77Cal
		1 Cup Thin	14g ↔	62Cal
	Fermented Sorghum Porridge	1 Cup	20g ↑	99Cal
Wheat (Refined) 	Porridge	1 Cup Thick	63g ↑	260Cal
		1 Cup Thin	52g ↑	215Cal
	Chapati (fried with oil)	abt 8" across	40g ↔	357Cal
	Chapati (without oil)	abt 8"across	35g ↔	198Cal



FRUITS

FOOD	FORM/NATURE	QTY/AMT	CARB COUNT	CALORIE CONTENT
Apple 	Fresh	1 medium (2"across) size	15g ↓	60Cal
	Fresh apple Juice	1 cup	28g ↓	116Cal
Avocado 	Fresh ripe	½of Large (about 3.5" across)	15g ↓	334Cal
Yellow Banana 	Fresh ripe	1 Small-sized (ndiizi)	15g ↓	64Cal
		1 Large-sized (Bogoya)	30g ↓	112Cal




Grapes 	Grapes Fresh (AP)	17 grapes	15g ↓	60Cal
	Grapes juice	1 cup	38g ↓	155Cal
Gooseberries 	Ripe berries	1½ cup	15g ↓	78Cal
Guava 	Whole fresh	2 fruits (abt 2" across)	10g ↑	46Cal






Jack Fruit 	Edible Bulbs	abt 7 medium bulbs	20g ↔	84Cal
	Fresh Ripe	1 Cup, sliced	40g ↔	156Cal
Jambula 	Fresh edible pulp	1 cup	15g ↓	60Cal
Orange 	Whole Fresh	Small (about 2" across AP yield)	15g ↓	60Cal
	Orange Juice	1 Cup	25g ↔	112Cal



Mango 	Fresh ripe without skin	Half of mango (3" across)	15g ↔	60Cal
	Fresh Unripe Without skin	Half of mango (3"across)	12g ↓	48Cal
Pawpaw (Papaya) 	Fresh, Ripe	1 cup, cubes	15g ↔	55Cal
	Fresh, Ripe	Slice 7.5" long & 4cm across Or 7 cubes 1" across	10g ↔	40Cal
Passion Fruit 	Juice	1 cup	30g ↔	126Cal
	Ripe Fruit (AP) Edible Pulp	2 fruits (2" across)	10g ↓	35Cal



Pineapple 	Fresh, Ripe	¾ cup cubes	15g ↔	60Cal
	Fresh, Ripe	Slice about 8" long & 2cm thick	10g ↔	44Cal
	Pineapple juice	1 cup	30g ↓	130Cal
Tangerine 	Fresh , Ripe	2 Small fruits (2" across), AP yield	15g ↓	60Cal
	Juice	1 cup	25g ↔	107Cal
Watermelon 	Fresh	Cubes (1¼ cup)	15g ↓	60Cal
	Fresh	From 2" thick & 6" long AP slice yield	8g ↓	30Cal



<p>Raspberry</p> 	<p>Fresh</p>	<p>1 cup</p>	<p>15g ↓</p>	<p>60Cal</p>
<p>Strawberry</p> 	<p>Fresh ripe, whole</p>	<p>1¼ Cup</p>	<p>15g ↓</p>	<p>60Cal</p>



MILK AND MILK PRODUCTS

Milk



Skimmed

1 cup

12g ↓

90Cal

Whole

1 cup

10g ↓

150Cal

Yoghurt



Low fat (unsweetened)




1 cup

15g ↓

90Cal



PULSES, NUTS & SEEDS




FOOD	FORM/NATURE	QTY/AMT	CARB COUNT	CALORIE CONTENT
KidneyBeans 	Dry beans sauce without oil	About 1 Ladle serving	15g ↓	117Cal
Groundnuts (Peanuts) 	G.nut sauce	1 Ladle serving	5g ↓	175Cal
	Dry roasted with salt	2 Levelled Ladles Or (20 tablespoons)	12g ↓	548Cal
	Cooked in shell	1cup in-shell, edible yield	3g ↓	305Cal
Lentils 	Cooked	1 Ladle serving	12g ↓	84Cal






Peas 	Cooked green pea sauce	2Ladle serving	5g ↓	120Cal
	Cooked dry Pea sauce (no oil)	1 Ladle serving	12g ↓	72Cal
Soya (Soy) 	Green cooked and drained	1 Ladle	5g ↓	64Cal
	Roasted soybeans	1 heaped Ladle Or (10 tablespoons)	35g ↓	470Cal
	Soya porridge (plain)	1 cup	10g ↓	111Cal






VEGETABLES

FOOD	FORM/NATURE	QTY/AMT	CARD COUNT	CALORIE CONTENT
<p>Amaranthus (dodo)</p> 	Leaves cooked & drained	4 Ladles	4g ↓	27Cal
<p>Cabbage</p> 	Cooked	2 Ladles	5g ↓	25Cal
<p>Carrot</p> 	Raw chopped	1 Cup	12g ↓	52Cal
	Raw	1 medium (5cm long & 3cm across)	6g ↓	25Cal





<p>Cauliflower</p> 	<p>Cooked</p>	<p>2 Ladles</p>	<p>5g ↓</p>	<p>25Cal</p>
<p>Cucumber</p> 	<p>Cooked</p>	<p>2 Ladles</p>	<p>5g ↓</p>	<p>25Cal</p>
<p>Mushroom</p> 	<p>Cooked</p>	<p>2 Ladles</p>	<p>5g ↓</p>	<p>25Cal</p>






<p>Okra</p> 	<p>Cooked</p>	<p>2 Ladles</p>	<p>5g ↓</p>	<p>25Cal</p>
<p>Pumpkin</p> 	<p>Cooked</p>	<p>Slice (abt 6" long & 2" across)</p>	<p>4g ↑</p>	<p>20Cal</p>
<p>Spinach</p> 	<p>Cooked</p>	<p>2 Ladles</p>	<p>5g ↓</p>	<p>25Cal</p>







<p>Taro leaf</p> 	Cooked	4 Ladles	6g ↓	35Cal
<p>Tomato</p> 	Ripe, Raw	1 Cup	5g ↓	25Cal
<p>Egg plant</p> 	Cooked	2 Ladles	5g ↓	25Cal



MISCELLANEOUS

FOOD	FORM/NATURE	QTY/AMT	CARB COUNT	CALORIE CONTENT
Wheat Bread (Baked) 	Brown bread (unrefined wheat)	1 slice Of a '1kg Loaf'	15g ↓	80Cal
	White bread (refined wheat)	1 slice of a '1kg Loaf'	15g ↓	80Cal
	Bun (refined wheat)	1 bun (abt 2" thick & 3" across)	15g ↑	80Cal
Sugar Cane 	Unrefined cane sugar	1 teaspoon	5g ↓	20Cal
Honey 	Raw (unrefined)	1tablespoon	16g ↔	64Cal

<p>RICE & MEAT PILLAU</p> <p>WHITE RICE + GOAT'S MEAT + ONION + VEGETABLE OIL + GARLIC + CARROTS</p>	Mixed dish, cooked	Full "250ml" bowl	117g 	885Cal
<p>MAIZE & KIDNEY BEAN DISH</p> <p>DRY MAIZE GRAINS + DRIED BEANS + SALT + COOKING OIL</p>	Mixed dish, cooked	Full "250ml" bowl	108g 	783Cal
<p>MATOOKE WITH KIDNEY BEANS</p> <p>MATOOKE + DRIED BEANS + VEGETABLE OIL + TOMATO</p>	Mixed dish, cooked	Full "250ml" bowl	100g 	467Cal
<p>CASSAVA WITH KIDNEY BEANS</p> <p>CHOPPED CASSAVA + DRIED BEANS + VEGETABLE OIL + TOMATO + ONIONS</p>	Mixed dish, cooked	Full "250ml" bowl	108g 	633Cal

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Food analysis Software
 - Carb-counter (carbcounter.net)
 - Nutri-Survey (WHO 2005)
 - USDA Nutrient Data Lab (NDL)
 - MyFoodAdvisor, (American Diabetes Association)

Websites

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