



Report by the EWB-KNUST on the Kitchen Stove Project  
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Compiled by: EWB-KNUST Stove Project Team

This report summarizes the findings from Engineers Without Borders (EWB) KNUST at Ullor in the Upper West Region of Ghana.

### **Pot Dimensions for Kitchen and Household Pots**

There are eight (8) different sized cooking pots contributing to a total of twenty – six pots that are used by the kitchen staff of the school. These pots are traditionally named as 6, 10, 12, 15, 25, 30, 50 and 60, having upper inner diameters 30 cm, 34 cm, 36 cm, 39 cm, 42 cm, 50 cm, 60 cm and 70 cm respectively, with the 60 cm (50) pots being the predominant pots used. The stoves team categorised these pots into three (3) according to size, namely; small, medium and large pots. Pots below 39 cm upper inner diameter were grouped as Small, pots of size 39 cm and 42 cm upper inner diameter were also grouped as medium pots and those above 42 cm, large pots. The heights and base diameters (in this case, the diameter of the protruding sides of the pot) of the individual pots were also measured with the aid of the measuring tapes present. The details of the individual pots' dimensions are presented in Table 2.1.

The pots used by the homes of the Ullo community were traditionally named as 3 and 4, having base diameters of 18 cm and 20 cm. The heights of the individual household pots were measured as well.

### **Quantity of Water Used in Each Pot**

The maximum quantity of water (edge high filling) that can fill the different sized pots were estimated, assuming the pots to be spherical, hence using the volume formula of a sphere.

$$V = \frac{\pi D^3}{6}$$

where D = Base Diameter

The maximum quantity of water for the different sized pots are shown in Table 4. The most cooked foods in the Ullo senior high school were identified as rice, beans, banku and tuo zaafi. The respective quantities of water needed to prepare these most enjoyed foods were also estimated using the dimensions of the cylindrical pan (Inner diameter of 60 cm and Height, 20 cm) shown in the figure below.



Figure: Cylindrical pan usually used for transferring water into cooking pots

## **Fuel**

Firewood is used for generating the needed heat for cooking. The main sources of this firewood are from dead neem trees and shea nut trees. The average firewood log that was present on had a diameter of about 17 cm and a height of about 160 cm. The average mass of such firewood log was measured to be 20.1 kg using a spring balance as shown in the figure below.



Figure: Weighing a typical tree log used as firewood (fuel)

It was found that for a 65×55 cm fuel opening of the traditional stoves (moulded stove), about five (5) of the 17 cm diameter firewood logs may be used for cooking any food.



Firewood being used for fuel at the Kitchen



Measurement of a fuel opening of a typical traditional cookstove in Ullo S.H.S.

It was also established that during the dry season, there's a higher rate of burning as a result of the higher degree of firewood drying and a relatively low relative humidity. This could cause the firewood to supply heat for about four (4) consecutive days before finishing. The wet season, on the other hand, does experience a much lower burning rate because of the high moisture that may be contained in the atmosphere (high relative humidity), hence taking an equal amount of firewood or fuel to supply heat for about six (6) days for cooking.

The modernized cookstoves housed in a building (with chimneys) typically have 80×80 cm fuel opening as shown in figure 5 and 6, allowing 16 logs of 17 cm diameter firewood at a time (theoretically). But in a practical sense about nine or ten (9 or 10) of such logs may be used to allow enough air circulation for better burning. It was also discovered that the modernized cookstoves perform better than the traditional ones that last for about three (3) months after construction, yet these modernized stoves are seldomly used because of the poor ventilation system that surrounds it, hence creating so much distress and discomfort to the kitchen staff.



The building housing the modernized cookstoves (with chimneys)

### **Height of School Stoves (Traditional Stoves)**

The kitchen staffs indicated their satisfaction and comfortability with the current heights of these stoves. The heights were grouped into two (2) as shown in Table 2.5, according to the level of energy required by kitchen women during cooking.

### **Available Materials for Bricks**

The community have clay materials of two kinds, the traditional white clay usually found in rice farms and the brown clay. The white clay is in abundance as compared to the brown clay. The team was notified on the fact that the current traditional stoves present were even made from the combination of the two clay materials and stones. The brick dimensions for the modernized cookstove were measured as 22×7×10 cm.

### **Fire Starters**

The kitchen staffs indicated that matches are the only thing used to help start a fire or burn fuel. They added that this practice is easier and comfortable to go by because of the fuel type used in the community (firewood).



Measuring the perimeter of the Kitchen area

## **2.8 Kitchen Stove Recommendations**

After taking the necessary data and making the right considerations, the team discussed and analysed the situation at hand and came up with a few recommendations:

1. Construction of the kitchen area of the traditional stoves under a proper shed with fans to ensure proper ventilation in the kitchen area.
2. A more improved user-friendly kitchen stoves.