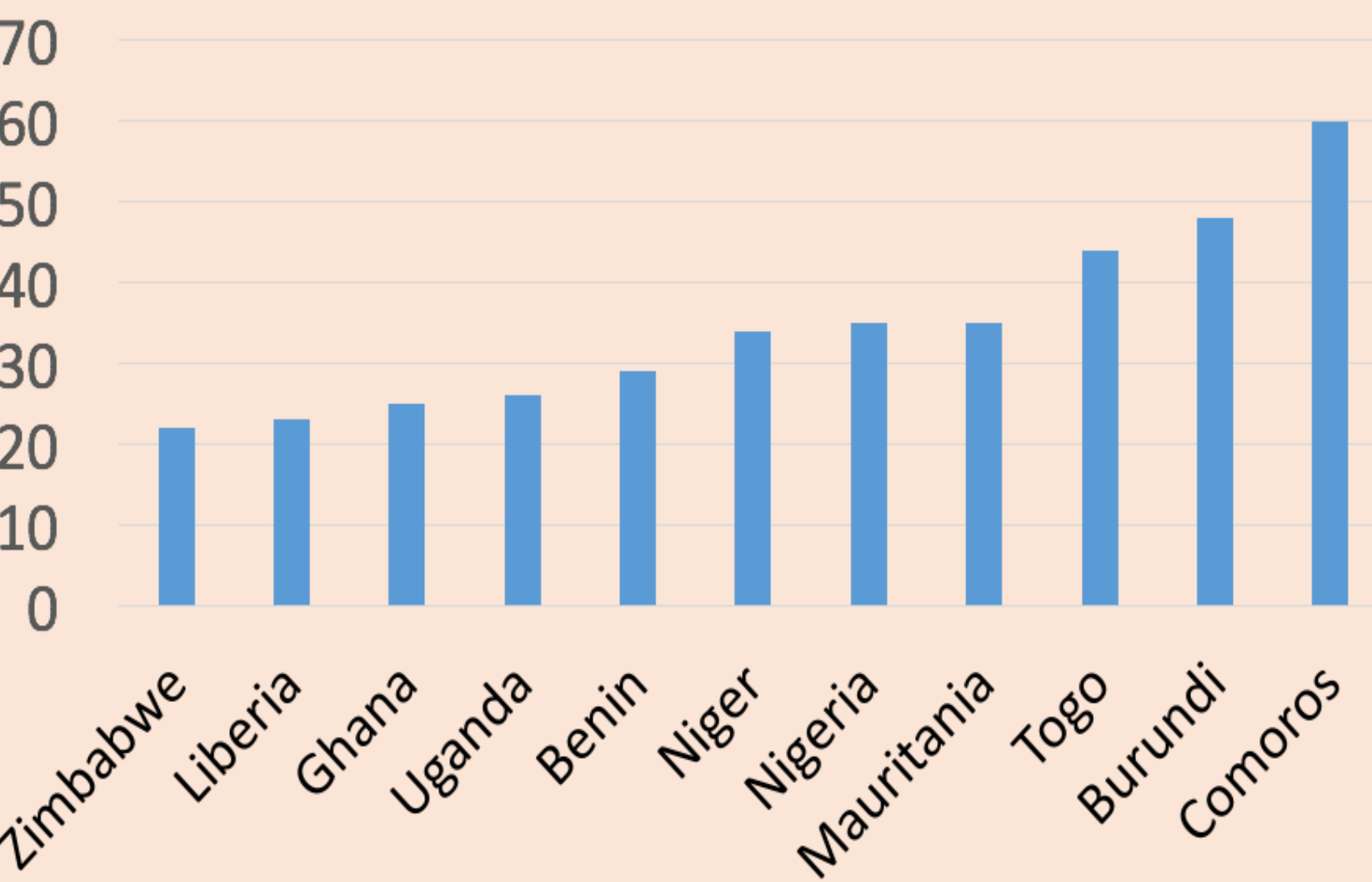




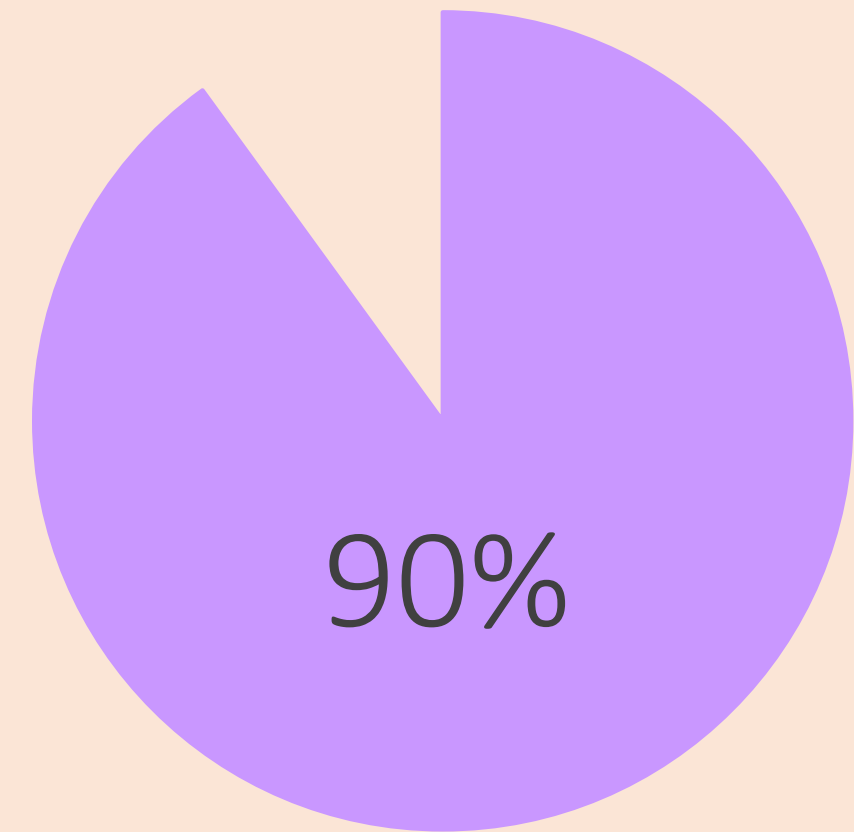
## Problem

The use of solid biofuels for cooking is harmful to both people's health and the environment. Solar cookers are a possible solution to this epidemic, however current solar cooker designs do not satisfy users.

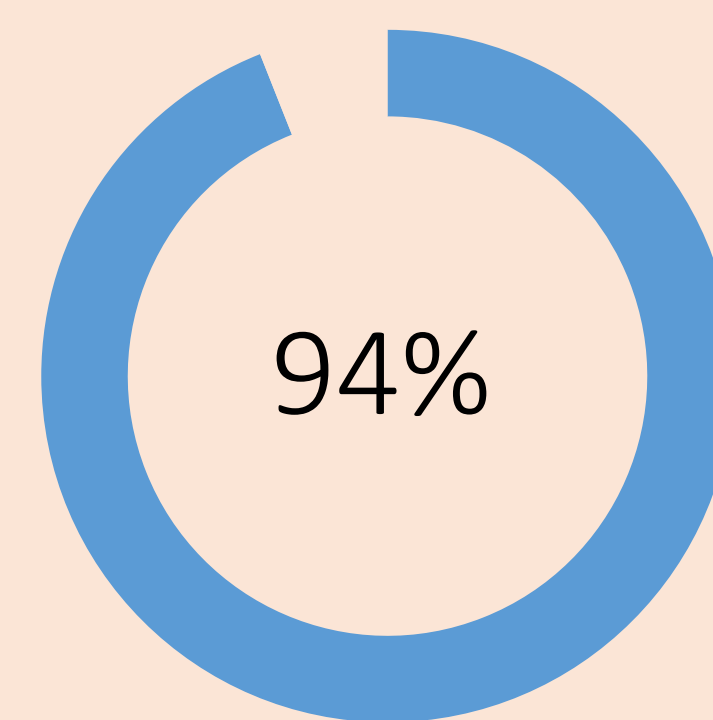
Percentages of Forest Lost 1990-2005



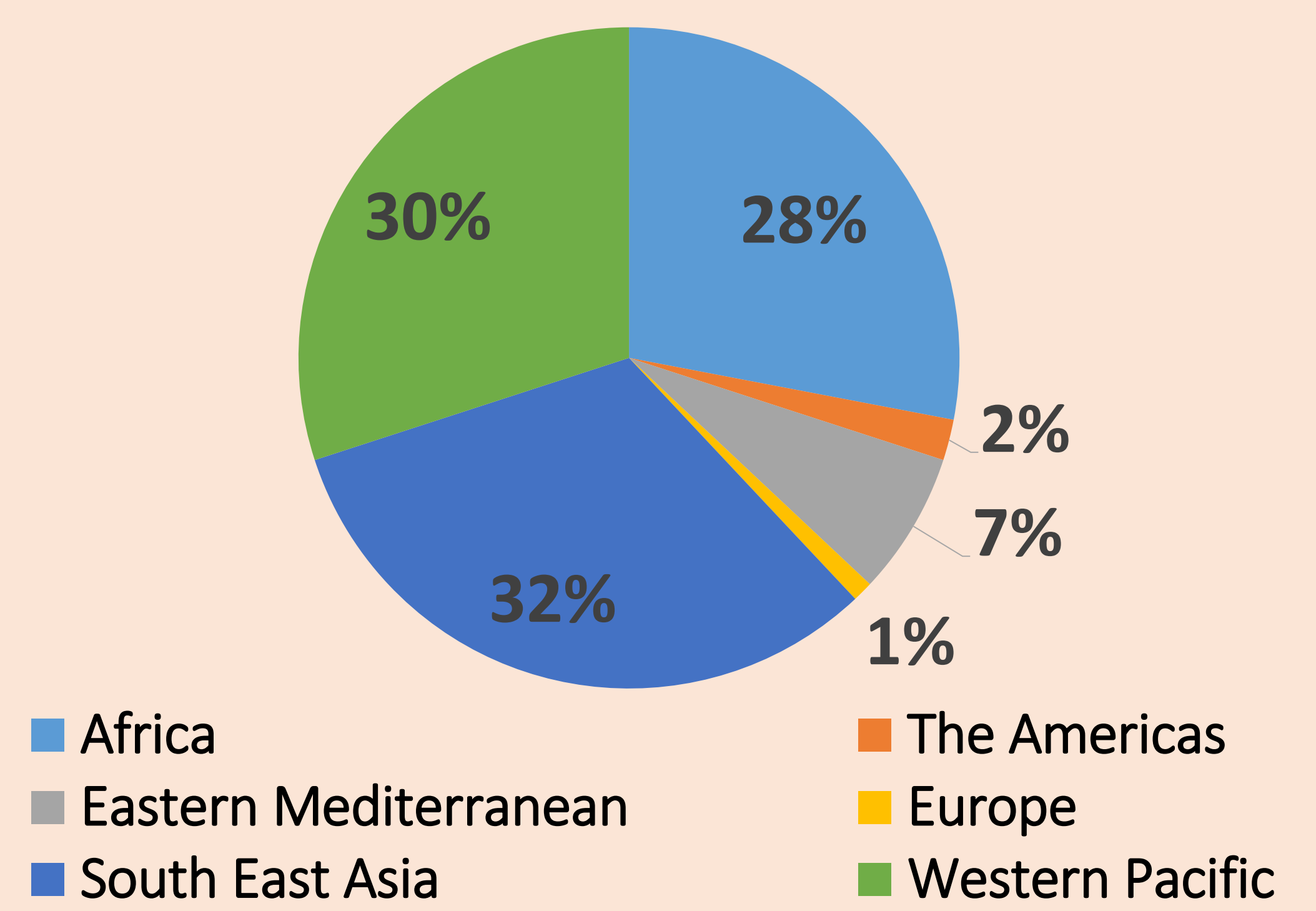
Percent of Africa that Uses Solid Fuels to Cook



Percent of Nigeria Exposed to Levels of Air Pollution that Exceed WHO Standards



Deaths Attributed to Solid Fuel Use, 2004



## Research

Experiment



Meetings with IQP Project Directors

Problems with design of solar cookers:

- Capacity
- Not as fast
- Can't cook in morning or evening
- Only offers cooking via boiling water
- Has to be perfectly positioned toward the sun

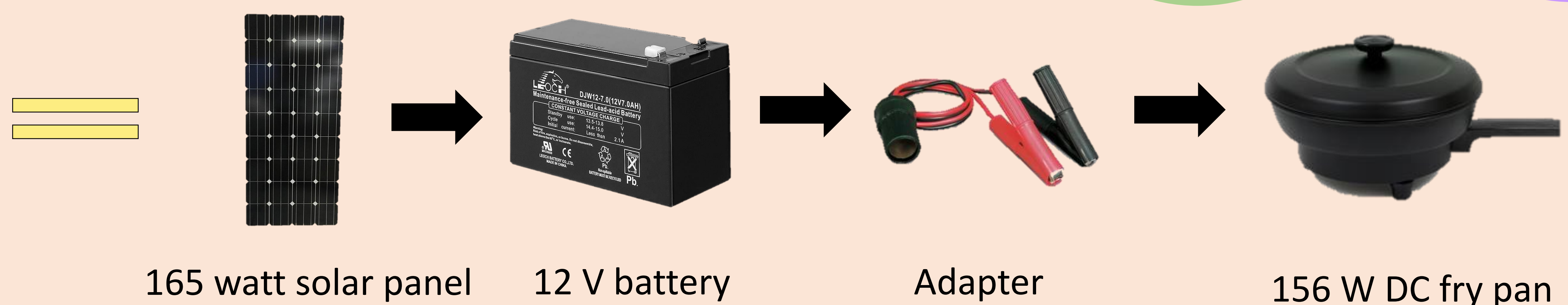
Senegalese Village Experiment

- Assessed user's satisfaction with solar cookers

55.5% of people wanted to cook indoors

73.9% of people disliked the small limit on food capacity

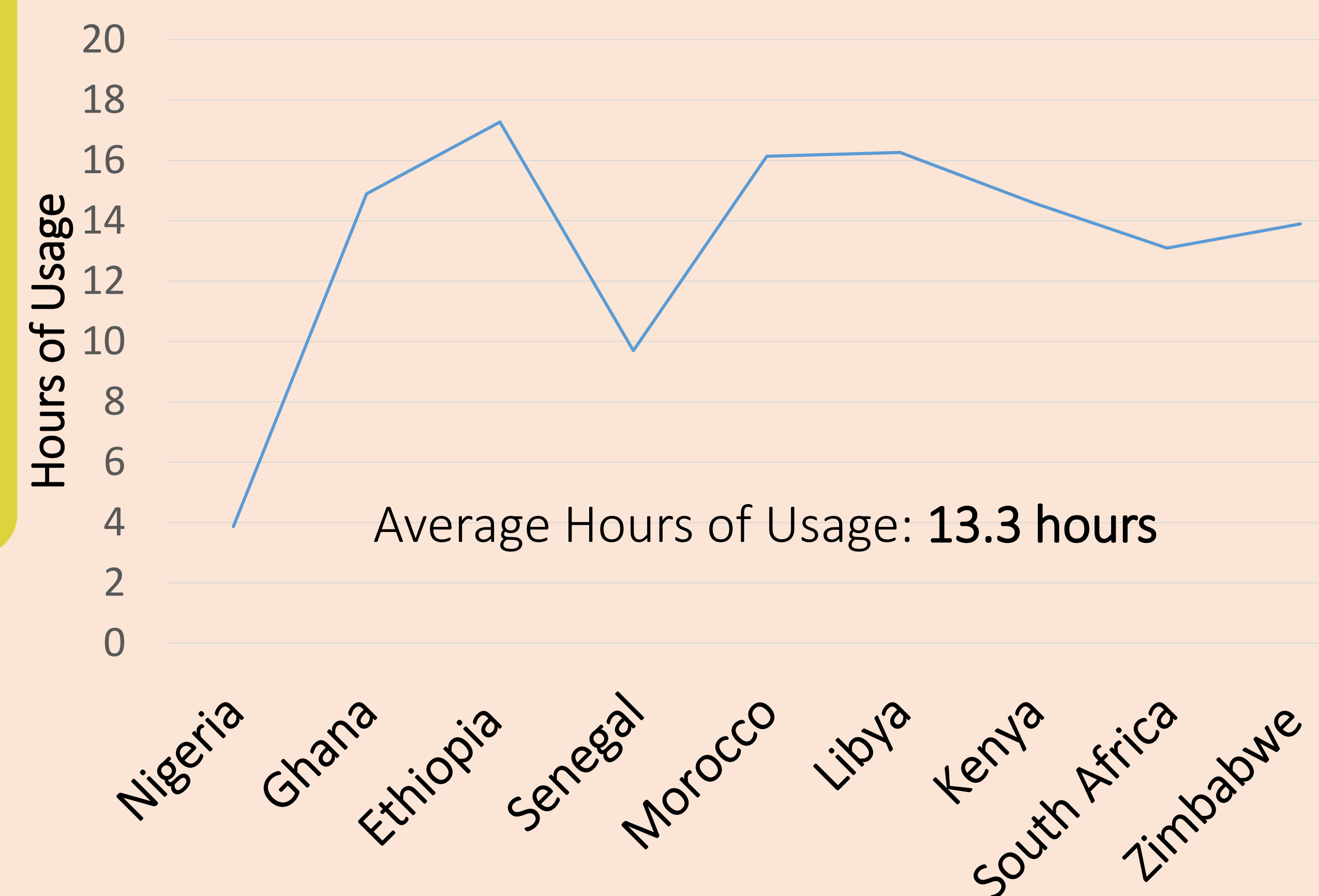
## Solution



Battery operated 12 V DC fry pan powered by solar panels

- Calculations:
  - PVWatts Calculator found the average annual kWh/year for different countries in Africa, and we used our appliance values to determine the hours of usage
- Cost: \$480
  - Most of the cost is due to the solar panel → multiple families can share
  - Since African families only need about 4 hours to cook, 3 families can share one panel (\$160 per family, could be possibly taken care of by NGO funding)
- Implementation: Panel would be a one time set up (no training), unlike solar cookers

Hours of Usage with 156W Appliance due to the Average Annual kWh in Each Country



## Conclusion

Our system solves multiple problems that users had with solar cooking:

- After the battery is charged in the sun, cooking indoors and at night is possible
- Using a fry pan to cook is considerably faster
- Other cooking methods besides boiling water can be used
- More food can be cooked at once

## References

Bulled, N. (2017, April 6). [Personal interview]. Peet, C. (2017, March 28). [Personal interview].  
 Barnes, B., Mathew, A., Thomas, E., & Bruce, N. (2009). Household energy, indoor air pollution and child respiratory health in south Africa. *Journal of Energy in Southern Africa*, 20(1), 4-13.  
 Vanschoenwinkel, J., Lizin, S., Swinnen, G., Azadi, H., & Passel, S. V. (2014). Solar cooking in Senegalese villages: An application of best-worst scaling. *Energy Policy*, 67, 447-458. doi:10.1016/j.enpol.2013.12.038  
 Vidal, J. (2016, October 20). Air pollution more deadly in Africa than malnutrition or dirty water, study warns. Retrieved March 03, 2017, from