

# **A nutrition sensitive approach to delay the progression of HIV to AIDS among People Living with HIV (PLWH) in Nigeria**

**By**

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# Outline

- **Introduction and rationale**
- **Aim and Objectives**
- **Method and Study design**
- **Results**
- **Outcomes (short – long terms)**
- **Future/on-going applications**
- **Conclusions**

# Introduction and Rationale

**HIV/AIDS is a pandemic disease worsened by the presence of conditions such as under-nutrition and opportunistic infections (*USAID, 2004; UNAIDS, 2008*).**

# Introduction and Rationale



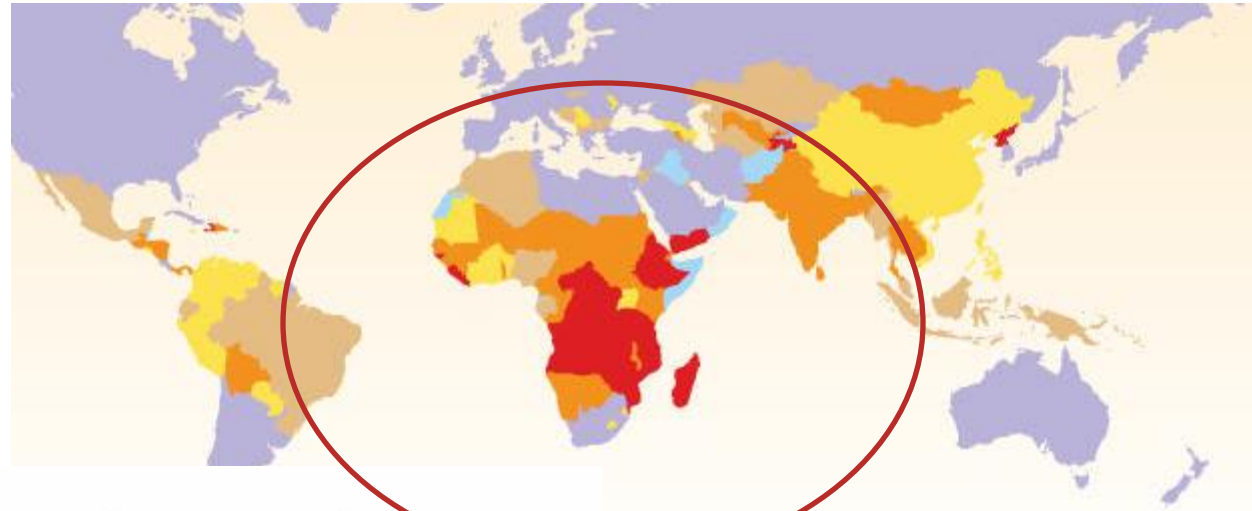
## Malnutrition $\rightarrow$ HIV

- Weakened immune system
- Increased susceptibility to OI
- Slower healing
- Poorer response to treatment
- Possibly more rapid disease progression

## HIV $\rightarrow$ Malnutrition

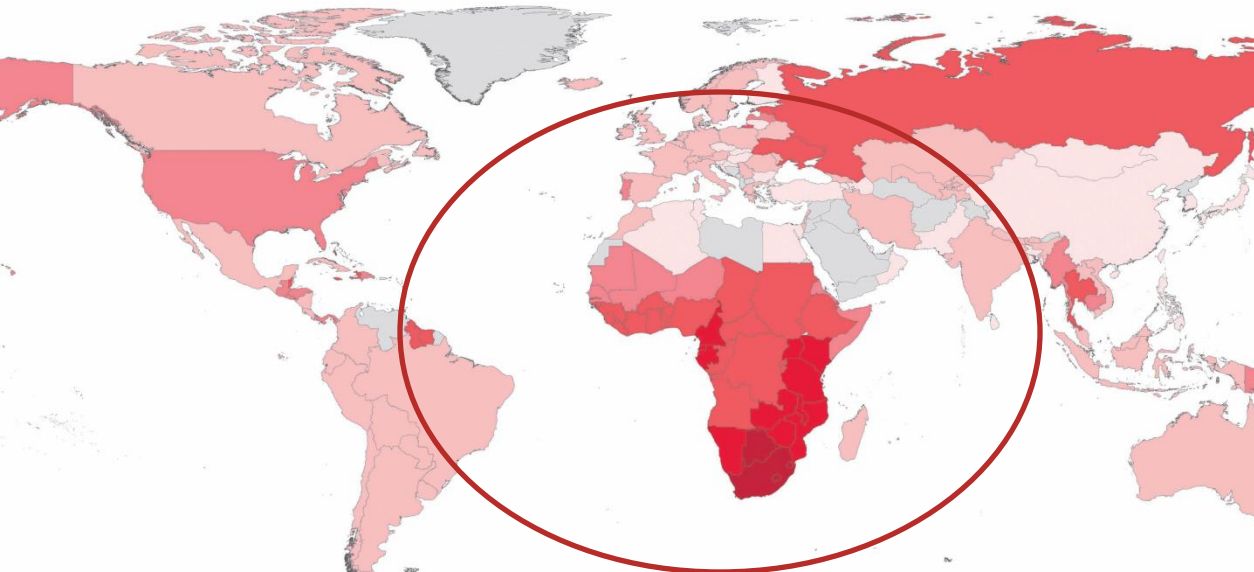
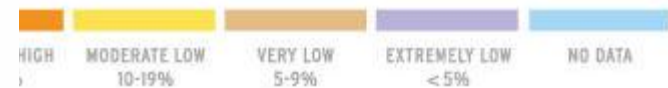
- Reduced food intake
- Increased nutrient needs
- Altered nutrient absorption
- Altered nutrient metabolism

# Undernutrition



## 2010: A global view of HIV infection

33.3 million people [31.4–35.3 million] living with HIV, 2009

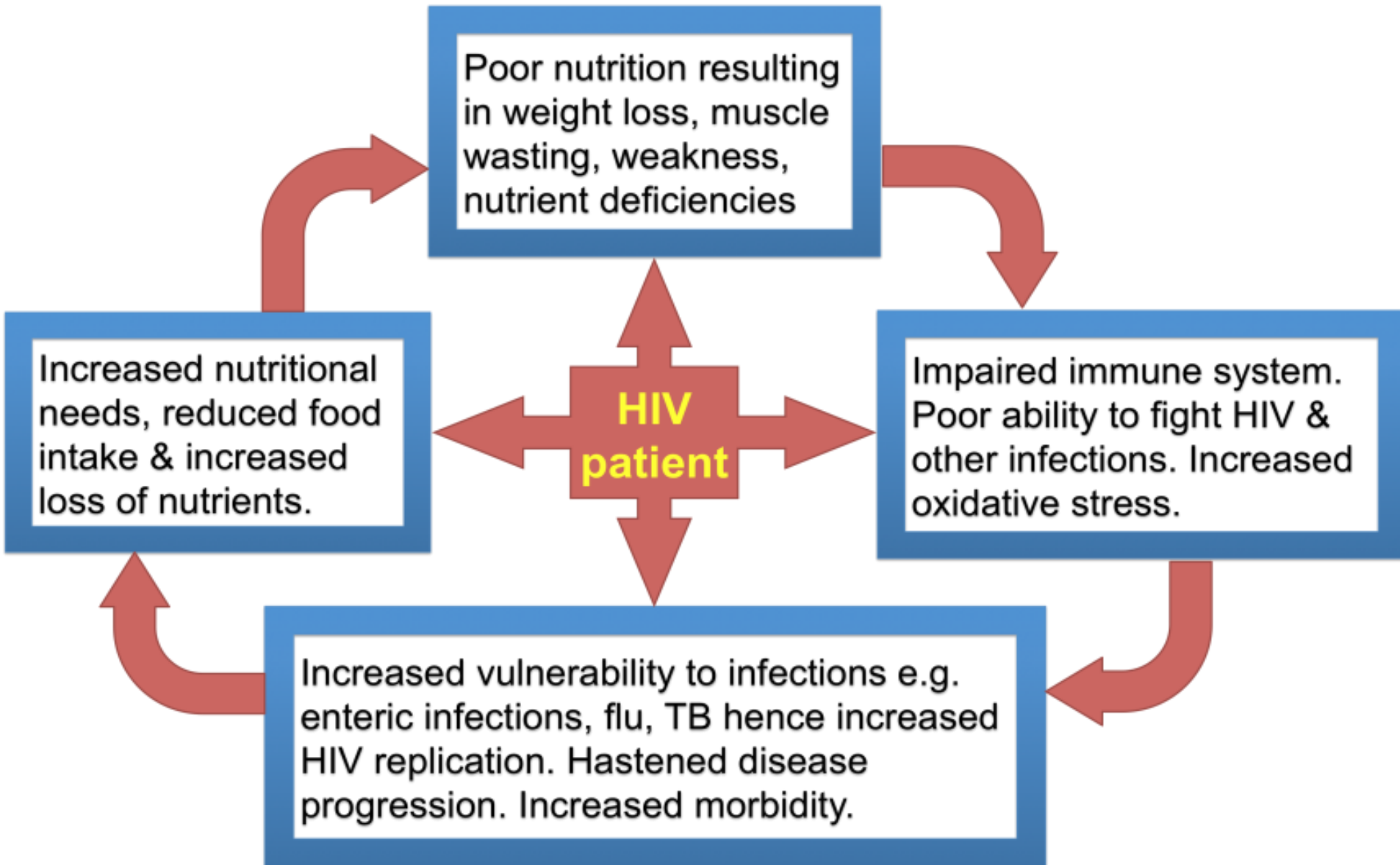


Sub-Saharan Africa (SSA) remains the region most heavily affected by HIV/AIDS, accounting for 67% of all people living with HIV and for 75% of AIDS deaths in 2007 (USAID, 2004; UNAIDS, 2008).

# Estimate of People Living with HIV infection (CIA WORLD FACTBOOK 2012)

S/N	Rank of Country	People Living With HIV/AIDS
1	South Africa	6,070,800
2	Nigeria	3,436,600
3	India	2,085,000
4	Kenya	1,646,800
5	Mozambique	1,554,700
6	Uganda	1,549,200
7	Tanzania	1,472,400
8	Zimbabwe	1,368,100
9	United States of	1,200,000

# Vicious Cycle of Malnutrition and HIV (Source: RCQHC and FANTA 2003)



	<b>Normal value /mm<sup>3</sup></b>	<b>HIV value/mm<sup>3</sup></b>	<b>AIDs value/mm<sup>3</sup></b>
<b>CD4 Count</b>	500-1600	Vary*	Less than 200 500

## Effects of Malnutrition and HIV on the Immune System

### Malnutrition



CD4 T-lymphocyte number  
CD8 T-lymphocyte number  
Delayed cutaneous hypersensitivity  
CD4/CD8 ratio  
Serologic response after immunizations  
Bacteria killing

### HIV

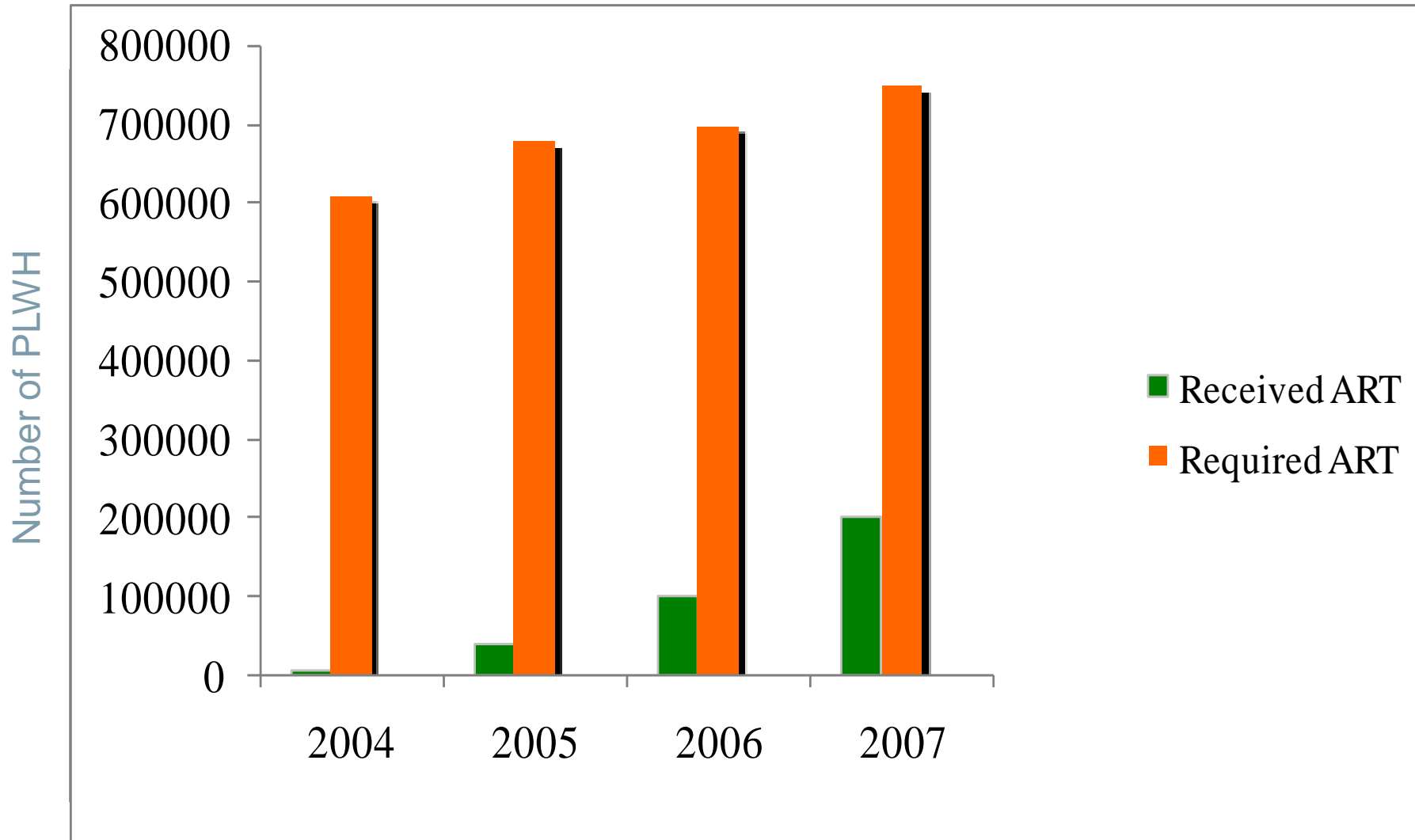




# Introduction and Rationale

- **The revised recommendation for antiretroviral therapy (ART) will include an earlier start to treatment for all HIV-infected individuals with a CD4-cell count of 350/mm<sup>3</sup> or less (WHO, 2010)**
- **Incidentally, all the HIV/AIDS interventions programmes at the moment focus on the remaining 25% of HIV infected subjects in Nigeria**
- **Presently, 75% of Nigerians infected with HIV do not require ART, but nutritional assistance to maintain the immune system**

# Number of PLWH who received ART against those who needed it



PLWH = People living with HIV  
ART = Anti Retroviral Treatment

- WHO recommends that nutritional care and support with macro/micronutrients must be started at the early stages of the infection in order to prevent **weight loss** and **malnutrition** (Piwoz and Preble, 2000; WHO, 2009).

# WHO recommends: Total Energy intake

- The Energy needs of symptomatic individuals are **20 to 30%** in addition to normal intake per day.
- Asymptomatic HIV-positive individuals need **10% more** energy (per day) than HIV-negative individuals of the same age and sex (*Piwoz, 2004; FANTA, 2004, WHO/FAO, 2009*).

# Hypothesis

**Daily intake of tailored functional meal optimised to provide immune-boosting micronutrients from indigenous sources in Nigeria delays progression of HIV to AIDS by ameliorating the nutritional status (*BMI, MUAC*) and improving the biochemical indices (*CD4 count, PCV, RG, SGOT, and TP*) in People Living with HIV (with a CD4 count above 200cells/mm<sup>3</sup>).**

# Aim

To compare the long and short term effect of a nutrition sensitive approach to delay the progression of HIV to AIDS among People Living with HIV (PLWH) in Nigeria

# Methods and Study Design

## *In summary*

**Step 1: Development of a functional meal**

**Step 2: Nutrition Intervention of optimised meal (short term versus long term)**

## Enrollment

Assessed for eligibility (n=1000)

## Pilot

Randomised (n= 100)  
• Participants in pilot progressed to scale-up intervention. This group of participants was monitored for one year

Excluded (n=600)

- Not meeting inclusion criteria (n=350)
- Declined to participate (n=50)
- Other reasons (n=200): Distance study centre, access to other treatment protocol

Randomised (n= 400)  
• Achieved through computer generated numbers  
• Allocated to Test and Control groups

## Allocation (Baseline)

Allocated to intervention (n= 200)  
• Received allocated intervention (n= 100)  
• Did not receive allocated intervention (give reasons) (n=100) Reason: Control

Allocated to intervention (n=200)  
• Received allocated intervention (n=100)  
• Did not receive allocated intervention (n=100) Reason: Control

## Follow-Up (3 & 6 months)

Lost to follow-up (n=6) Reason: Absconded.  
Discontinued intervention (n= 2) Reason: Travelled out of the study centre

Lost to follow-up (n=3) Reason: Absconded  
Discontinued intervention (n=5): Travelled, Redeployed out of Abuja the Study site

## Analysis (After 6 months)

Analysed (n=192)  
• Excluded from analysis (n=6) Reason: incomplete data

Analysed (n=192)  
• Excluded from analysis (n=10) Reason: incomplete data



## Step 1: Development of a functional meal

In West Africa, there are **many macronutrients in commonly available** food sources that may contain antioxidants and relevant essential vitamins and minerals. Such food sources need to be appropriately analyzed vis-a-vis their potentials for use in the management of HIV/AIDS.

Therefore, the focus of this public health nutrition intervention programme was to develop an optimized meal containing macro and micro nutrients from natural food sources in Nigeria **employing the tailored food recipe (TFR\*) concept**.

This tailored meal will be optimized with the aim of **improving the nutritional status** and subsequently **boosting the immune system** of recruited participants. The benefit of this intervention is sustaining the 75% of PLWH in Nigeria who do not require ART at a CD4 count level (i.e.  $CD4 \geq 350$  cells/mm<sup>3</sup>) that will not require initiation of ART and also maintaining the CD4 count of PLWH in Nigeria who are on ART at  $\geq 200$  cells/mm<sup>3</sup>.

# Definition of TFR

## **\*Tailored Food Recipe -TFR:**

**Food that is naturally occurring, accessible, affordable and perhaps consumed in unusual concentrations as part of the usual diet and demonstrate physiological and or biomedical benefits in reducing the risk of chronic disease beyond basic nutritional functions (Amlogu et al, 2012; 2013 and 2014).**

# TFR Ingredients *(all are locally produced and readily available)*



Moringa



Soya bean



Millet



Carrot

Sundried, roasted, powdered ingredients



+



+



+



Mixed percentage to produce the intervention meal

**TFR = Amtewa (100gm)**

Ready for sensory evaluation





# Step 2: Nutrition Intervention of optimised *Amtewa meal*

# Design of the study (12 months)

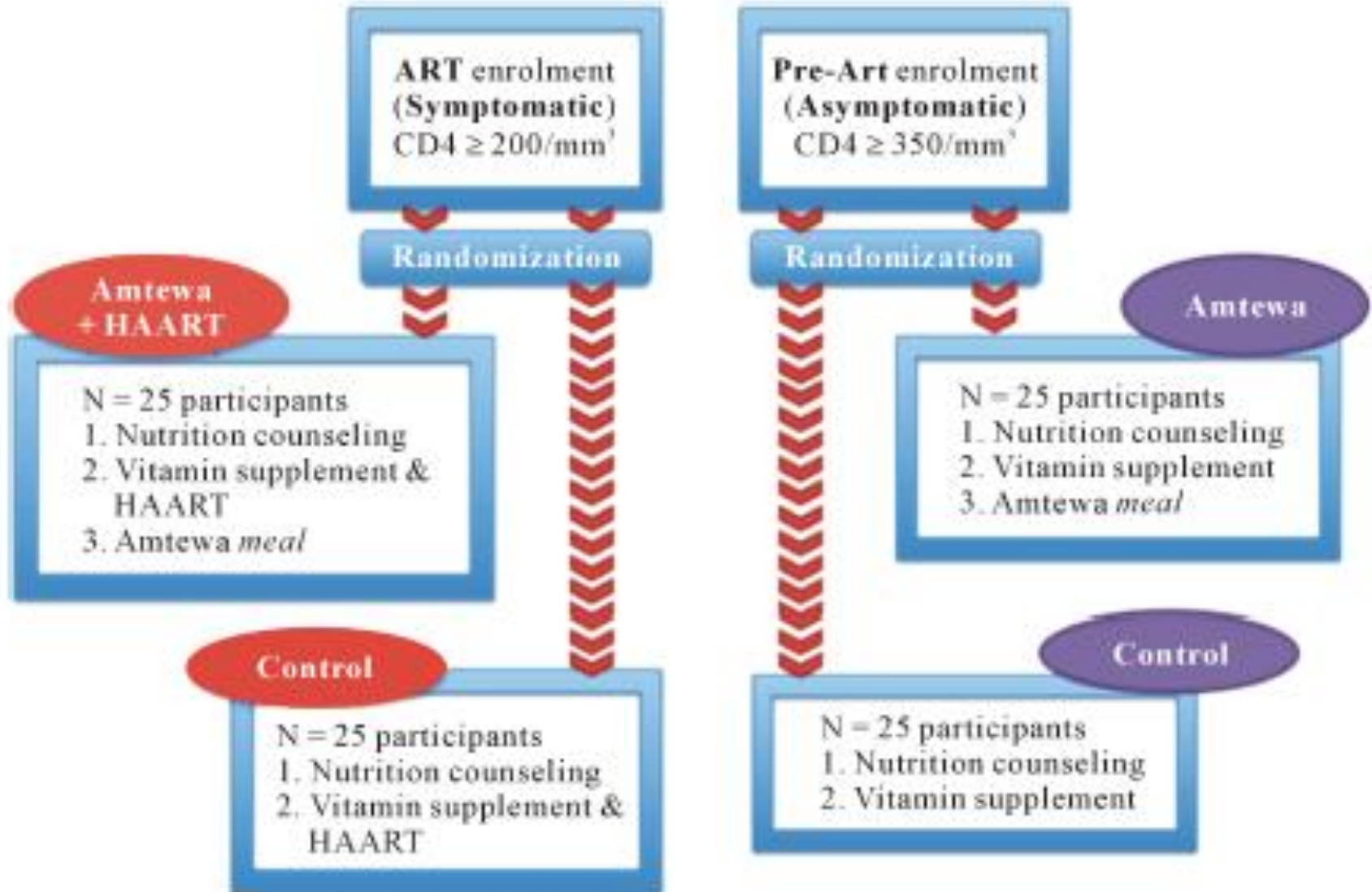


Figure 2. Illustrating the two arms of study design (Symptomatic vs Asymptomatic) and showing the patients on Amtewa meal, Amtewa + HAART versus their controls.





Briefing the very 1<sup>st</sup> participant before taking her anthropometric measurements (MUAC, BMI) followed by blood tests (CD4)



# Results

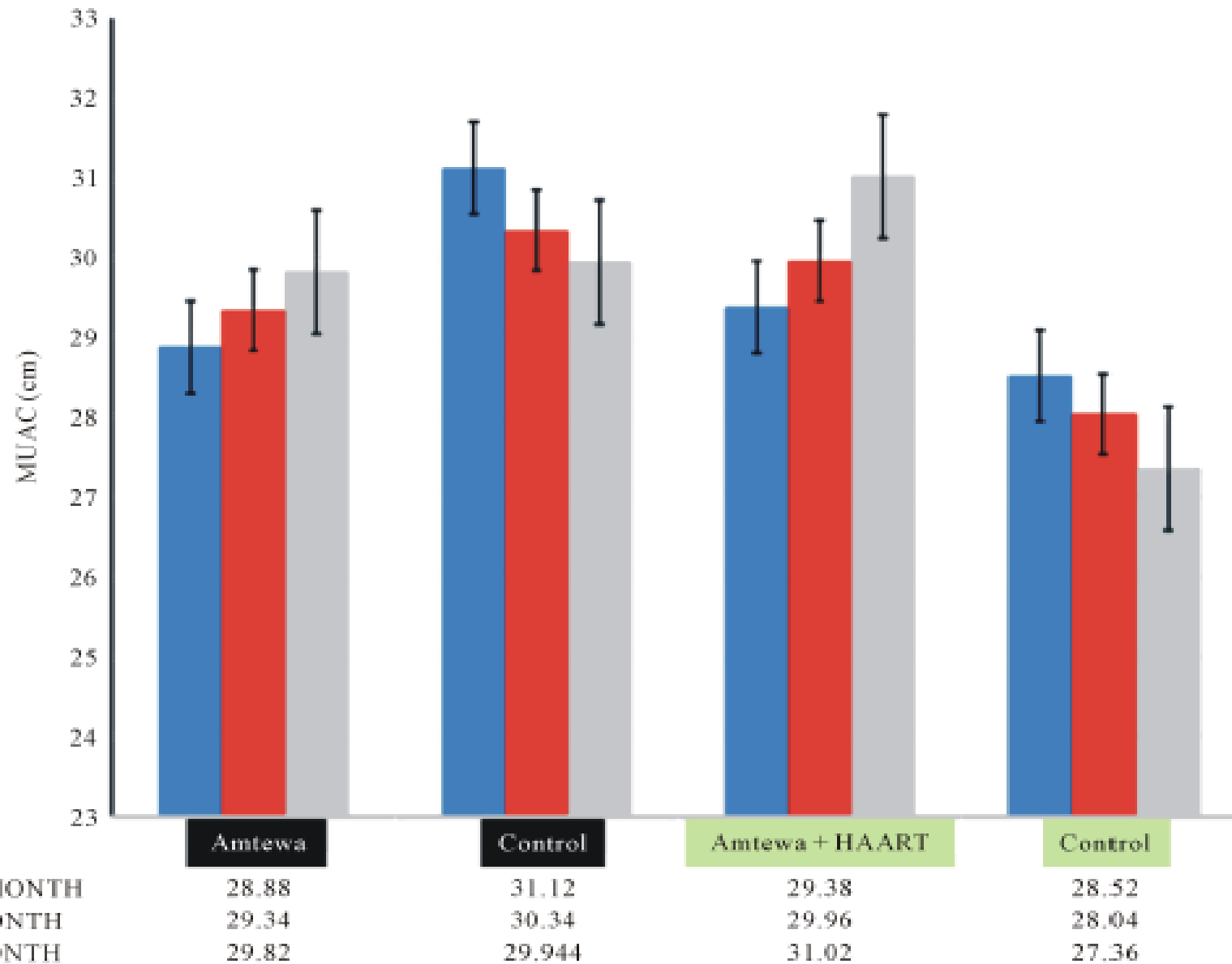


Figure 3. Bar chart showing the impact of Amtewa meal on MUAC (cm) of study patients (n = 100).

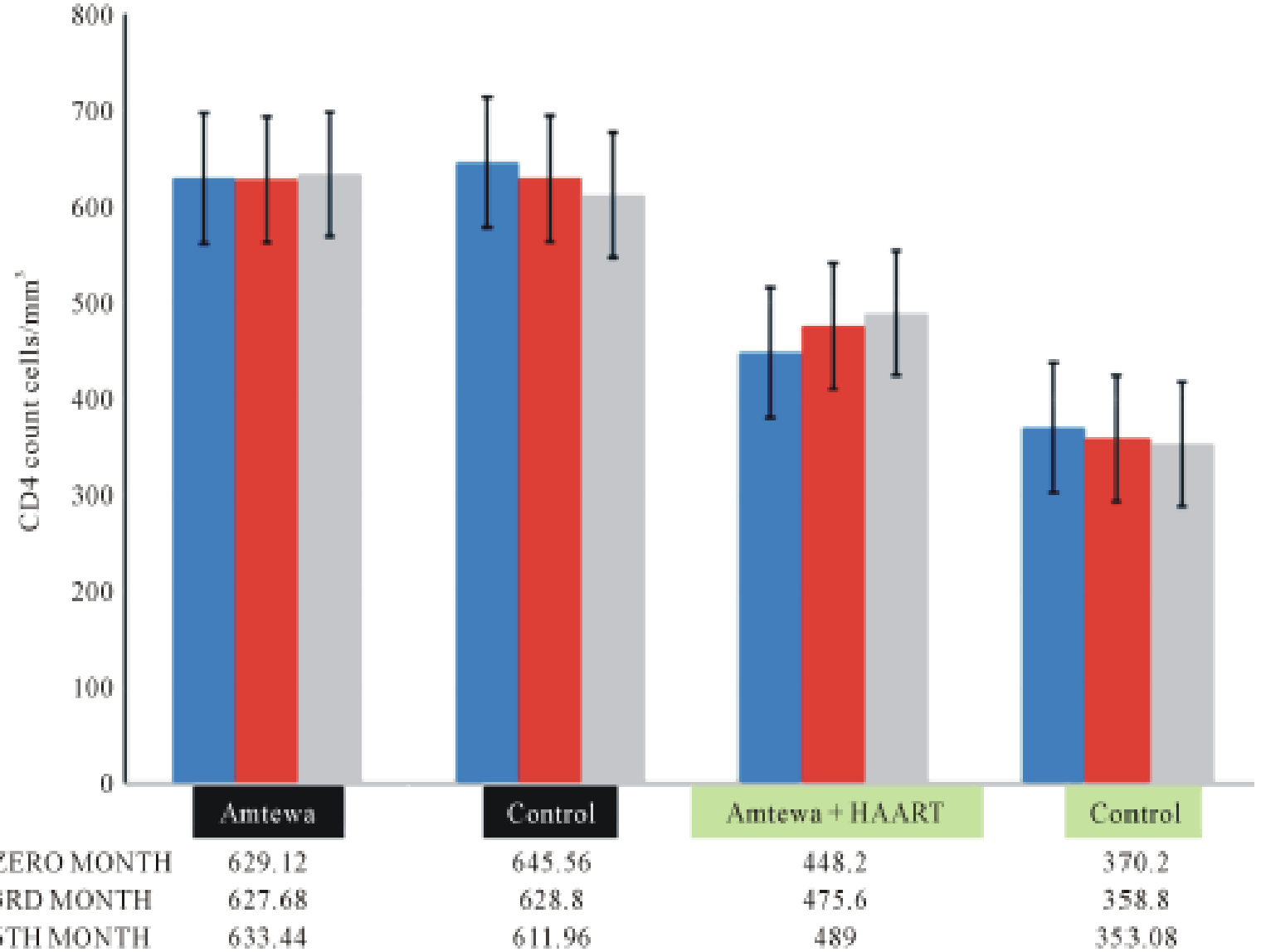
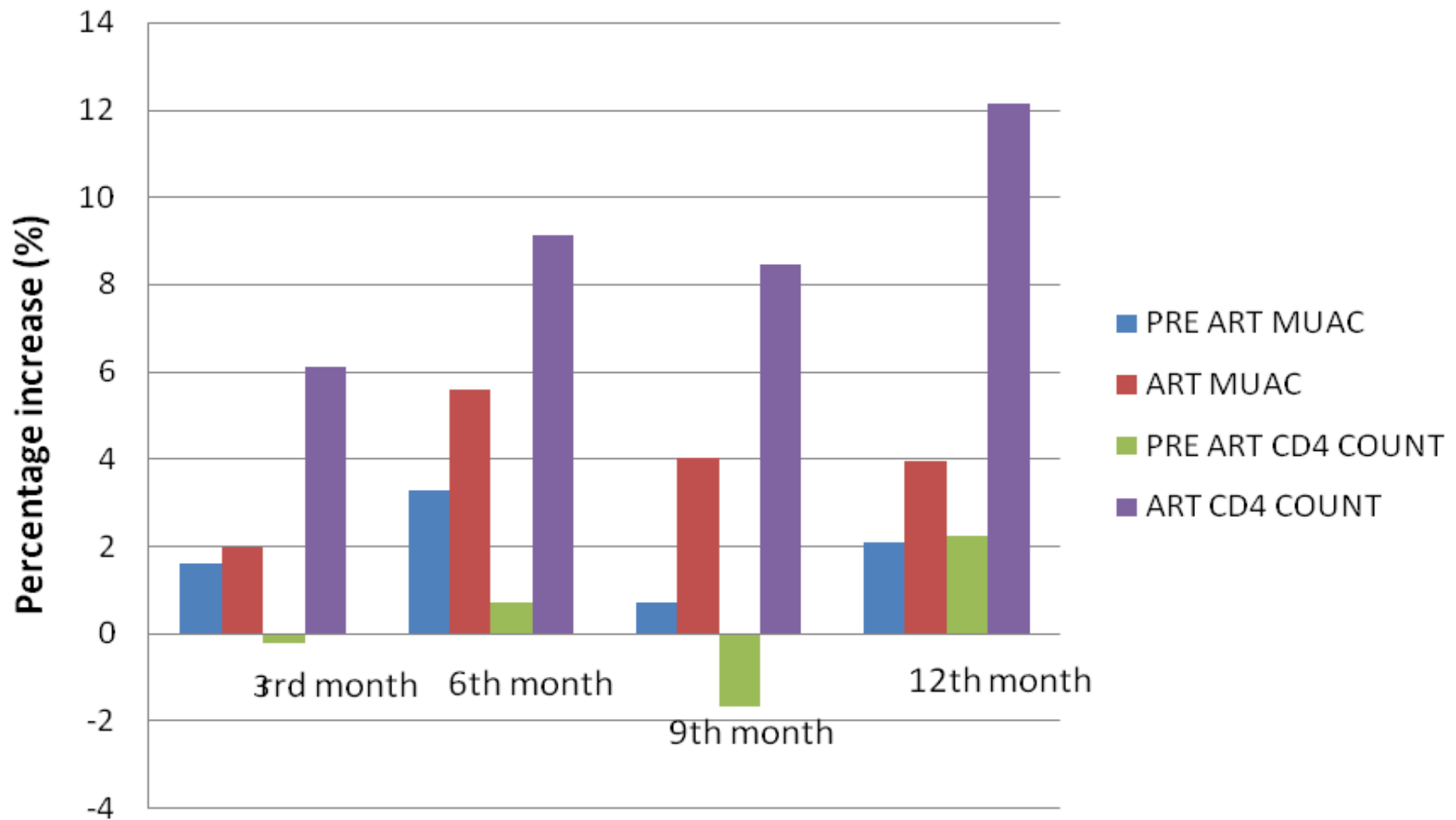


Figure 4. Bar chart showing the impact of Amtewa meal on CD4 (count cell/mm<sup>3</sup>) of study patients (n = 100).



**Percentage increase in participants' CD4 Count and MUAC over twelve (12) months period (n=100)**

## Percentage increase/decrease (n=100)

<b>Months</b>	<b>Pre-ART MUAC</b>	<b>ART MUAC</b>	<b>Pre-ART CD4 count cells</b>	<b>ART CD4 count cells</b>
<b>0 - 3</b>	<b>1.59</b>	<b>1.97</b>	<b>-0.23</b>	<b>6.11</b>
<b>6</b>	<b>3.25</b>	<b>5.58</b>	<b>0.69</b>	<b>9.10</b>
<b>9</b>	<b>0.69</b>	<b>4.02</b>	<b>-1.70</b>	<b>8.43</b>
<b>12</b>	<b>2.08</b>	<b>3.95</b>	<b>2.21</b>	<b>12.14</b>

- **Data on the impact of macro and micronutrients on the progression of HIV to AIDS (short versus long term).**
- **Meeting the daily requirements of some essential minerals and vitamins (selenium, zinc, iron etc and vitamins - A, B, C, D, and E).**
- **Achieving and maintaining an ideal body weight**
- **Decreasing functional impairment from under-nutrition (muscular fatigue, bedridden state and work incapacity)**
- **Improving immune function**
- **Improved quality of life**

# Potential future applications of TFR

- ✓ **TFR for the delay of cancer Cachexia to refractory Cachexia**
- ✓ **TFR for ADHD and Autistic children (FORD: Fish oil rich diet)**
- ✓ **TFR for children with low IQ**
- ✓ **TFR to prevent DM complications**
- ✓ **TFR to prevent Osteoporosis**



- **The gained result suggests that a prolonged consumption of the intervention meal (Amtewa) will be cost effective and suitable to sustain the gained improvements in the anthropometric and biochemical indices.**
- **Prolong longevity, improve quality of life of and retention at workplace of PLWHIV**
- **Overall, it underpins the synergistic relationship between nutrition and HIV infection, the nutritional requirement and nutritional care and support for PLWH in Nigeria.**

# Publications based on this study

- **Amlogu**, M. A., Tewfik, S., Wambebe, C., Godden, K. and Tewfik, I. (2011) Conceptual framework of public health-nutrition intervention programme to attenuate the progression of HIV to AIDS among People Living with HIV (PLWH) in Abuja, Nigeria. In Sharing Knowledge Making a Difference: The Role of International Scientific Cooperation, World Sustainable Development Outlook 2011. ISBN 978-1-907106-12-5, 11-20.
- **Amlogu**, A.M., Godden, K., Tewfik, S., Wambebe, C. & Tewfik, I. (2012). Tailored Food Recipe – TFR: Employing the European perspective on functional food science (FUFOSE) to promote effective dietary intervention in Africa. International Journal of Food, Nutrition & Public Health, 5 (1/2/3), 1-10.
- **Amlogu**, A.M., Godden, K., Tewfik, S., Wambebe, C. & Tewfik, I. (2013). Public Health Nutrition Intervention Programme to Attenuate the Progression of HIV to AIDS among People Living with HIV (PLWH) in Abuja, Nigeria: A Conceptual Framework. International Journal of Food, Nutrition & Public Health, 6 (1) 83-98.
- **Amlogu**, A.M., Tewfik, S., Wambebe, C. & Tewfik, I. (2014). Tailored Functional Recipe (TFR) approach to delay the progression of HIV to AIDS among People Living with HIV (PLWH) in Abuja, Nigeria. Scientific Research Journal of Pharmacology & Pharmacy, 5: 925 – 936
- **Amlogu**, A.M., Tewfik, S., Wambebe, C. & Tewfik, I. (2014). Innovative Nutritional approach to attenuate the progression of HIV to AIDS among People Living with HIV (PLWH): A study based in Abuja, Nigeria. Manuscript submitted for a Book chapter in “African Indigenous Medical Knowledge and Human Health”. University of South Africa (UNISA) Press.

**Thank you for listening**

