

**Table S1: Summary Table: Assessment of Individual Studies by Outcome**

Study Characteristics					Key Findings [Magnitude of effect (HR, OR, RR, RD & 95% CI) or other description]	Quality of evidence for individual studies			Evidence from Economic Evaluation (e.g., cost- effectiveness) <i>(Yes or No; if Yes, brief description and rating of quality of study (Level 1, 2, or 3)**</i>	Comments
Citation	Study Design (e.g., RCT)	Study Period, Country	NACS Inter- vention	No. Partici- pants		External and Internal Validity <i>(1=Good; 2=Fair; 3=Poor)</i>		Overall Quality of Evidence Rating* <i>(1=Strong; 2=Medium; 3=Weak)</i>		
						Internal Validity (Bias)	External Validity (Generaliz- ability)			
Mortality										
Bowie et al, 2005 <sup>21</sup>	Single-arm, historical controls	2003-2004, Malawi	WFP ration of maize, beans, and CSB; Half received oil	360	6-mo mortality pre-food was not different from post-food (logrank p = 0.65); Mortality rate was lower in those who received oil compared to those who did not (logrank p = 0.0001)	3	2	3	No	<5% not HIV-infected; Random assignment for oil not strictly adhered to; Dist. of food rations not reliable; High mortality overall (~33%); None on ART
Cantrell et al, 2008 <sup>19</sup>	Cohort	2004-2005, Zambia	WFP ration of maize, beans, veg oil, and CSB	636 (442 food, 194 controls)	12-mo mortality: 6% food group vs. 8% controls (p = 0.23)	2	2	2	No	More food insecure and CD4<50 in food clinics; Low mortality overall; All subjects initiating ART
Manary et al, 2010 <sup>22</sup>	Single-arm, historical controls	2006-2007, Malawi	RUSF or CSB	491 in RCT, # of controls not stated	Supplementary food use was not directly associated with improved survival.	3	2	3	No	No data presented in paper; All subjects initiating ART.
Ndekha et al, 2009 <sup>18</sup>	RCT	2006-2007, Malawi	RUSF vs. CSB	491 (245 RUSF, 246 CSB)	14-wk mortality: 27% RUSF vs. 26% CSB; HR (RUSF vs. CSB) = 0.91 (0.73 - 1.14)	1	1	3	No	High mortality overall; All subjects initiating ART.

Sadler et al, 2012 <sup>20</sup>	Cohort	2010+, Ethiopia	RUTF	2,595 (1,956 RUTF, 639 no RUTF)	Mortality rates = 1.5% for RUTF and 0.8% for no RUTF group (p = 0.18)	2	2	2	No	Low mortality overall; ~80% on ART for average of 30 mos. (RUTF) and 28 mos. (no RUTF)
Serrano et al, 2010 <sup>24</sup>	Single-arm, historical controls	2006-2007, Niger	WFP ration of cereal, legumes and veg oil	180 (62 food; 118 controls)	6 mo. mortality significantly lower in food group vs. controls (mortality ratio = 0.19; p<.05)	2	2	3	No	Food group had lower BMI; Subjects on ART for varying lengths of time (median duration = 6 mos.)
Van Oosterhout et al, 2010 <sup>23</sup>	Single-arm, historical controls	2005-2007, Malawi	RUSF or CSB	593 (245 CSB, 244 RUSF, 104 controls)	No difference in mortality between groups: OR (RUSF vs. controls) = 1.2 (0.8, 1.9) after 14 wk and 1.15 (0.73, 1.8) after 26 wk; OR (CSB vs. controls) = 1.2 (0.78, 1.96) after 14 wk and 1.18 (0.76, 1.82) after 26 wk	3	2	3	No	Food scarcity and use of co-trimoxazole were different between time periods; Unclear if tracing efforts similar across time periods; All subjects initiating ART.
<b>Morbidity</b>										
<i>Change in CD4 (in cells/mm<sup>3</sup>)</i>										
Azabji-Kenfack et al, 2011 <sup>25</sup>	RCT	2008-2009, Cameroon	Spirulina vs. soya beans	52 (26 spirulina, 26 soya beans)	12 wk CD4 change: +99 spirulina vs. +46 soya beans.	3	2	3	No	All subjects initiating ART.
Cantrell et al, 2008 <sup>19</sup>	Cohort	2004-2005, Zambia	WFP ration of maize, beans, veg oil, and CSB	404 (279 food, 125 controls)	6 mo. CD4 change: +154 food vs. +171 controls (p = 0.50). 12 mo. CD4 increase: +182 food vs. +180 controls (p = 0.96).	2	2	2	No	More food insecure and CD4<50 in food clinics; Low mortality overall; all subjects initiating ART
Chakravarty et al, 2009 <sup>27</sup>	Cohort (with PSM)	2002-2007, Kenya	Vegetables, staples, beans, oil, yogurt, eggs	1977 (548 non-food, 1429 food)	No difference in CD4 change between groups	3	2	3	No	Poor-quality electronic medical record data; not all eligible actually receive food; poor screening process for food eligibility; all subjects initiating ART

KEMRI, 2012 <sup>15</sup>	RCT, stratified by ART and pre-ART	2006-2008, Kenya	Nutrition counseling vs. Nutrition counseling plus food (300 g/day of FBF)	ART: 626 (348 food, 278 controls)  Pre-ART: 432 (239 food, 192 controls)	ART: No difference in CD4 change between groups  Pre-ART: 3 mo. CD4 change: +7 food vs. -33 controls (p = 0.04).	2	3	2	No	Overall very high rates of attrition; Losses to follow-up differed by study arm for some time points; Subjects in ART arm all initiated ART within 5 weeks of recruitment.
Ivers et al, 2014 <sup>34</sup>	RCT	2010-2011, Haiti	RUSF vs. CSB+	524 (285 RUSF, 239 CSB+)	No difference in CD4 change between groups at 6 or 12 mos.	2	2	3	No	CSB+ group more likely to be missing CD4 data at 12 months than RUSF group; Median ART duration: 12 mos. (CSB+) and 10 mos. (RUSF).
Ndekha et al, 2009 <sup>18</sup>	RCT	2006-2007, Malawi	RUSF vs. CSB	491 (245 RUSF, 246 CSB)	No difference in CD4 change between groups	1	1	3	No	All subjects initiating ART.
Nyamathi et al, 2013 <sup>28</sup>	Cohort	Not stated, India	High protein vs. standard protein supplements	68 (34 High protein, 34 low protein)	6 mo. CD4 change: +275 intervention vs. -31 controls (p = 0.0001)	3	3	3	No	In addition to protein supplements, intervention group received intense monitoring and interactive group sessions; Subjects on ART for varying lengths of time; Half were on ART for >18 mos.
Rawat et al, 2014 <sup>29</sup>	Cohort (with PSM)	2008-2009, Uganda	WFP ration of maize, pulses, veg oil, salt, and CSB	640 (319 food, 322 no food)	No difference in CD4 change between groups	2	1	2	No	All subjects ART naive (participants who started ART during the study were subsequently excluded - 23% food group and 19% no food group)

Sadler et al, 2012 <sup>20</sup>	Cohort	2010+, Ethiopia	RUTF	481 (428 RUTF, 53 no RUTF)	Median CD4 change: +29 RUTF vs. no change in no RUTF (p = 0.02); Controlling for baseline differences, RUTF had an increase in CD4 of 75.2 cells/mm <sup>3</sup> more than no RUTF group (p = 0.001).	2	2	2	No	CD4 data available for only 21% of RUTF and 8% of no RUTF; 80% in both groups on ART for average of 30 mos (RUTF) and 28 mos (no RUTF); Effects of food on CD4 were more apparent among those stable on ART.
Scarcella et al, 2011 <sup>37</sup>	Single-arm, before-after	2002+, Mozambique	WFP ration of cereals, pulses, peanuts, sugar, sunflower seed oil, and CSB	106 (84 on ART, 22 not on ART)	ART: 12 mo. CD4 change: +104, p < 0.001; <u>No ART</u> : 12 mo. CD4 change: +48, p>.05	3	2	3	No	84 on ART >6 mos
Serrano et al, 2010 <sup>24</sup>	Single-arm, historical controls	2006-2007, Niger	WFP ration of cereal, legumes and veg oil	160 (60 food; 100 controls)	6 mo. CD4 change: +114 food vs. +68 controls (p<.05)	2	2	3	No	Median ART duration = 6 mos.; ART adherence significantly better in food group vs. controls (98% vs. 77%; p < 0.005)
Swaminathan et al, 2010 <sup>30</sup>	Cohort	2005-2007, India	Indiamix - WFP ration of FBF	361 (281 food, 79 no food)	6 mo. CD4 change: +12.5 food vs. -60 no food (not significant after adjusting for baseline differences)	2	2	2	No	High rate of non-completers (43%); 40% initiated ART during study and became ineligible.
# of severe clinical events, change in WHO stage, Hemoglobin (Hgb) levels, self-reported HIV-related symptoms										
Alo et al, 2014 <sup>31</sup>	RCT	Not stated, Nigeria	Monthly, individual nutrition counseling	84 (42 intervention, 42 controls)	Mean Hgb levels: 12.1 mg/dL (intervention) vs. 11.2 mg/dL (controls), p = 0.0015).	2	2	2	No	All patients on ART

Rawat et al, 2010 <sup>32</sup>	Cohort (with PSM)	2002-2007, Uganda	WFP ration (CSB, vegetable oil, pulses & maize or rice) or USAID ration (CSB & veg oil)	14,481 (3370 food; 11,111 no food)	<u>No ART</u> : Food group was 3 percentage points less likely to progress to worse WHO stage than matched controls.  <u>ART</u> : No impact of food on WHO stage	2	2	2	No	Only 14,481 out of 195,676 (7%) had necessary data for inclusion; 12% on ART; 70% WHO Stage 2.
Rawat et al, 2014 <sup>29</sup>	Cohort (with PSM)	2008-2009, Uganda	WFP ration of maize, pulses, veg oil, salt, and CSB	641 (319 food, 322 no food)	<u>Overall</u> : No difference in Hgb levels between groups; Significant reduction in number of reported HIV-related symptoms (-4.1± 0.54, p<.01) <u>CD4 &gt; 350 cells/mm<sup>3</sup></u> : Significant increase in Hgb levels (+1.0 g/dL)	2	1	2	No	All participants ART-naive. ~30% lost to follow-up, died, or excluded due to 1) initiating ART (21%) or 2) receiving non-WFP food assistance in the no-food comparison group (5%).
Serrano et al, 2010 <sup>24</sup>	Single-arm, historical controls	2006-2007, Niger	WFP ration of cereal, legumes and veg oil	158 (61 food; 97 controls)	No difference in improvement in WHO stage: 44% (food) and 45% (controls), p>.05	2	2	3	No	Median ART duration = 6 mos.; ART adherence significantly better in food group vs. controls (98% vs. 77%; p < 0.005)
Van Oosterhout et al, 2010 <sup>23</sup>	Single-arm, historical controls	2005-2007, Malawi	RUSF or CSB	593 (245 CSB, 244 RUSF, 104 controls)	No. severe clinical events (hospitalization or death): <u>14 wks</u> : RUSF: 41%, CSB: 38%, Controls: 34% <u>26 wks</u> : RUSF: 50%, CSB: 49%, Controls: 38% (no p-values given)	3	2	3	No	Food scarcity and co-trimoxazole use different between time periods; Unclear if tracing efforts similar across time periods; All subjects initiating ART.

**Retention in Care (ART adherence)**

Cantrell et al, 2008 <sup>19</sup>	Cohort	2004-2005, Zambia	WFP ration of maize, beans, veg oil, and CSB	532 (366 food, 166 no food)	RR <sub>adj</sub> for MPR ≥ 95% = 1.5 (1.2 to 1.8)	2	2	2	No	84% had ART adherence data; all subjects initiating ART
Ivers et al, 2010 <sup>26</sup>	Cohort	2006, Haiti	WFP ration of cereal, legumes, veg oil, salt, and CSB	<u>6 mos:</u> 488 (237 food, 251 no food) <u>12 mos:</u> 340 (215 food, 125 no food)	<u>No. visits attended by 6 mos:</u> 5.5 (food) vs. 2.8 (no food), p < 0.0001 <u>No. visits attended by 12 mos:</u> 9.7 (food) vs. 8.3 (no food), p = 0.007	3	2	3	No	Food vs. no food groups were inherently different at baseline; many switched from no food to food during follow-up; Subjects on ART for varying lengths of time.
Ivers et al, 2014 <sup>34</sup>	RCT	2010-2011, Haiti	RUSF vs. CSB+	524 (285 RUSF, 239 CSB+)	No difference between groups in change in % with suboptimal adherence at 6 or 12 mos.	2	2	3	No	CSB+ group more likely to be missing interview data at 12 months than RUSF group; Median ART duration: 12 mos. (CSB+) and 10 mos. (RUSF).
Ndekha et al, 2009 <sup>18</sup>	RCT	2006-2007, Malawi	RUSF vs. CSB	491 (245 RUSF, 246 CSB)	No difference in ART adherence between groups	1	1	3	No	No data shown in paper; findings noted in abstract only; all subjects initiating ART.
Nyamathi et al, 2013 <sup>28</sup>	Cohort	Not stated, India	High protein vs. standard protein dal	68 (34 high protein, 34 low protein)	6 mo. Change in % adherent: +59% (intervention) vs. +14% (usual care), p = 0.0001	3	3	3	No	In addition to protein supplements, intervention group received intense monitoring and interactive group sessions focused on improving ART adherence and skills development; subjects on ART for varying lengths of time; half were on ART for >18 mos.

Serrano et al, 2010 <sup>24</sup>	Single-arm, historical controls	2006-2007, Niger	WFP ration of cereal, legumes and veg oil	158 (61 food; 97 controls)	<u>Adherence at 6 mos:</u> 98% (food) vs. 77% (controls) remained adherent to ART (p < 0.005).	3	2	3	No	Subjects on ART for varying lengths of time
Tirivayi et al, 2012 <sup>33</sup>	Cohort (with PSM)	2009, Zambia	WFP ration of maize, veg oil, peas, and CSB	168 (61 food, 107 no food)	<u>Overall:</u> MPR=98% (food) vs. 89% (no food), p<.01.  The following subgroups had greater improvements in adherence: those on ART <231 days; those with BMI <18.5; those in WHO stages III/IV; and those with CD4≤350.	1	2	2	No	Mean ART duration: 777 days (food) and 864 days (no food)
<b>Quality of Life</b>										
Bahwere et al, 2009 <sup>35</sup>	Single-arm, before-after	2005, Malawi	Chickpea sesame-based RUTF	42	Proportion of patients able to walk to clinic increased: 42% to 78% (p < 0.001);  Karnofsky score improved for 73.3%	3	3	3	No	Cotrimoxazole given concurrently; 75% WHO Stage 4 and 25% Stage 3; 13% initiated ART 1-2 mos. prior
KEMRI, 2012 <sup>15</sup>	RCT, stratified by ART and pre-ART	2006-2008, Kenya	Nutrition counseling vs. Nutrition counseling plus food (300 g/day of FBF)	<u>ART:</u> 626 (348 food, 278 controls)  <u>Pre-ART:</u> 432 (239 food, 192 controls)	<u>ART:</u> no difference in perceived health between groups;  <u>Pre-ART:</u> More improvement and fewer declines in perceived health in food group at one month (p = 0.02), but not at other time points.	2	3	2	No	Overall high rates of attrition; LTFU differed by study arm for some time points.

Greenaway et al, 2012 <sup>36</sup>	Single-arm, before-after	Not stated, Zambia	RUTF plus HEPS	91 (84 adults)	'Fully active' clients: 5% pre-intervention to 51% post-intervention.	3	3	3	No	Clients self-reported QOL pre- and post-intervention at the post-intervention time point; Small purposive sample selected from each of 11 clinics, not all ART clinics; No info on ART or disease status.
Ivers et al, 2010 <sup>26</sup>	Cohort	2006, Haiti	WFP ration of cereal, legumes, veg oil, salt, and CSB	488 (251 no food, 237 food)	<u>6 mos</u> : no difference in role-functioning QOL. <u>12 mos</u> change in role-functioning QOL score: +3.7 (food) vs. -3.8 (no food) (p = 0.13).	3	2	3	No	Food vs. no-food groups were inherently different at baseline; many switched from no food to food during follow-up; Subjects on ART for varying lengths of time.
Ivers et al, 2014 <sup>34</sup>	RCT	2010-2011, Haiti	RUSF vs. CSB+	524 (285 RUSF, 239 CSB+)	No difference between groups in change in general health perceptions score at 6 or 12 mos.	2	2	3	No	CSB+ group more likely to be missing interview data at 12 months than RUSF group; Median ART duration: 12 mos. (CSB+) and 10 mos. (RUSF).
Ndekha et al, 2009 <sup>18</sup>	RCT	2006-2007, Malawi	RUSF vs. CSB	491 (245 RUSF, 246 CSB)	No difference between groups in QOL measures at 14 weeks	2	2	3	No	All subjects initiating ART.
Sadler et al, 2012 <sup>20</sup>	Cohort	2010+, Ethiopia	RUTF	350 (334 RUTF, 16 no RUTF)	% showing improvement in functional status: 21.9% (RUTF) vs. 3.8% (no RUTF).	2	2	2	No (cost effectiveness determined for outcome of BMI recovery only)	Small number of original participants had this outcome assessed; ~80% on ART.
<b>HIV Transmission (Change in Viral Load (VL) )</b>										
Azabji-Kenfack, 2011 <sup>25</sup>	RCT	2008-2009, Cameroon	Spirulina vs. soya beans	52 (26 spirulina, 26 soya beans)	LogVL significantly lower in spirulina vs. soya beans at end of follow-up (4.5±0.49 vs. 4.8±0.36; p=.02).	3	2	3	No	All subjects initiating ART
Ndekha, 2009 <sup>18</sup>	RCT	2006-2007, Malawi	RUSF vs. CSB	491 (245 RUSF, 246 CSB)	No difference in VL between groups at end of 14 weeks	2	2	3	No	All subjects initiating ART.



Scarcella, 2011 <sup>37</sup>	Single arm, before-after	2002+, Mozambique	WFP ration of cereals, pulses, peanuts, sugar, sunflower seed oil, and CSB	106 (84 on ART, 22 not on ART)	<u>ART</u> : -102,200 copies, p<.001 <u>No ART</u> : -29,000 copies, p>.05	3	2	3	No	84 on ART >6 mos
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WFP = World Food Program; RUSF = ready-to-use supplementary food; CSB = corn soya blended flour; HR = hazard ratio; OR = odds ratio; RR = Relative Risk; FBF = fortified blended flour; RUTF = ready-to-use therapeutic food; HEPS = high energy protein supplement; QOL = quality of life; PSM = propensity score matching; RCT = randomized clinical trial; ART = antiretroviral therapy; veg = vegetable; Hgb=Hemoglobin; MPR = Medication Possession Ratio

