Supplementary Table S1. Literature search strategy by ProQuest Dialog service[1]

Set #	Keywords	Results
S5	(s1 and s2) not (s3)	686[3]
S4	Tio,ab,su,mesh,emb(animal or cat or feline or dog or canine or bird or avian or cow or bovine or heifer or Holstein or chick or chicken or insect or fly or rat or rats or rodent or mouse or mice or murine or chimp* or ape or hen or conference or "conference proceedings")	14394892[2]
S3	Tio,ab,su,mesh,emb("kidney disease" or "renal disease" or "renal failure" or "kidney failure" or tumour or tumor or oncology or cancer or neoplasms or hemodialysis or dialysis)	8792304[2]
S2	Tio,ab,su,mesh,emb(albumin or prealbumin or transthyretin or "total protein" or hemoglobin or "c-reactive protein" or "total lymphocyte count" or creatinine or leptin or "insulin-like growth factor-1" or "igf binding protein-1" or transferrin or "retinol-binding protein" or "total cholesterol" or triglyceride or "low-density lipoprotein cholesterol" or "high-density lipoprotein cholesterol" or orosomucoid or "25-hydroxycholecalciferol" or "red blood cell count" or "white blood cell count" or "blood urea nitrogen" or (homocysteine and "methylmalonic acid") or "pyridoxal-5-phosphate" or "gh-binding protein" or "a1-acid glycoprotein" or "tumor necrosis factor-alpha" or "interleukin-1 beta" or "interleukin-6" or "creatinine clearance" or "aspartate aminotransferase" or "alanine aminotransferase" or ferritin or cholinesterase or hematocrit)	2624944[2]
S1	Tio,ab,su,mesh,emb("mini nutritional assessment" or "subjective global assessment" or "malnutrition screening tool" or "malnutrition universal screening tool" or "nutritional risk screening" or "short nutritional assessment questionnaire" or "nutritional risk index" or "detailed nutritional assessment")	7475[2]

[1] Databases include Embase®, Embase® Alert, Foodline®: SCIENCE, FSTA®, MEDLINE®, ProQuest Dissertations and Theses Professional. [2] Duplicates are removed from the search, but included in the result count. [3] Duplicates are removed from the search and from the result count.

Supplementary Table S2. Results of quality assessment of included studies[1]

Year	Author	CK 1	CK 2	CK 3	CK 4	CK 5	CK 6	CK 7	CK 8	CK 9	CK 10	CK 11	CK 12	CK 13	CK 14	Quality
1995	Coppini	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
1997	Gloria	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
1998	de Groot	Y	Y	N	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
1999	Niyongabo	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2000	Duerksen	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	Y	NA	N	Fair
2000	Murphy	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2000	Sacks	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	Y	NA	N	Good
2000	Vellas	Y	Y	NR	N	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2002	Christensson	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2002	Covinsky	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	Y	NA	N	Good
2002	Persson	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2003	Gerber	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2003	Magri	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2003	Pirlich	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2003	Ruiz-Lopez	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2004	Delacorte	Y	Y	N	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2004	Kyle	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2004	Peña	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2004	Sakarya	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2004	Sungurtekin (surgery)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2004	Sungurtekin	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2005	Alves de Rezende	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Bouillanne (3y)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Bouillanne (6-mo)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Gómez Ramos	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2005	Kagansky	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Kuzuya	Y	Y	NR	N	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair

2005	Martineau	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Poor
2005	Sağıroğlu	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Soini	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2005	Valero	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2006	Bonin-Guillaume	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2006	Cereda	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2006	De Luis	Y	Y	NR	Y	Y	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2006	Kruizenga	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2007	Inoue	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2007	Neumann	Y	Y	Y	Y	N	N	N	N	Y	NA	Y	Y	NA	N	Fair
2007	Pham	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2007	Reyes	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2008	Atalay	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Poor
2008	Cereda	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2008	Cereda (PIMAI)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2008	Salvi	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2008	Sungurtekin	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2009	Lei	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2009	Venzin	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Amirkalali	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Calderon Reyes	Y	Y	NR	Y	Y	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Cereda	Y	Y	N	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Poor
2010	Drescher	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Filipovic	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2010	Gupta	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Prescha	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2010	Saka	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2010	Sánchez-Muñoz	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2010	Ulger	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2011	Alhamdan	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair

2011	Bonilla-Palomas	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	Cereda	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	De Luis	Y	Y	NR	Y	Y	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	Filipovic	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	Kaburagi	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2011	Kim	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	Leandro-Merhi	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2011	Mirarefin	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2012	Al-Najjar	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Poor
2012	Duran Alert	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2012	Gallo	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2012	Ji	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2012	Nogay	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2012	Vischer (Case-control)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2012	Vischer (Perpective)	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2013	Boban	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Donini	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2013	Guo	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Holst	Y	Y	Y	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Kinugasa	Y	Y	Y	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Poor
2013	Kuyumcu	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2013	Lee	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Nykanen	Y	Y	Y	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Olveira	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2013	Rambousková	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2013	Sargento	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2013	Soysal	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2014	Abd-El-Gawad	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2014	Akin	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2014	Bassim	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair

2014	Drevet	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2014	Mayasari	Y	Y	NR	Y	Y	N	N	N	Y	NA	Y	NR	NA	N	Fair
2014	Rasheed	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2014	Trufa	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2014	Yosry	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2015	Demir	Y	Y	NR	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Fair
2015	Jeejeebhoy	Y	Y	Y	Y	Y	N	N	Y	Y	NA	Y	NR	NA	N	Good
2015	Kissova	Y	Y	Y	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Poor
2015	Konturek	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2015	Matsumura	Y	Y	NR	Y	N	N	N	N	Y	NA	Y	NR	NA	N	Fair
2015	Rohrig	Y	Y	Y	Y	N	N	N	Y	Y	NA	Y	NR	NA	N	Poor
2015	Zhou	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	Y	NA	N	Fair
2016	Alzahrani	Y	Y	N	Y	N	N	N	N	Y	N	Y	NR	NA	N	Fair
2016	Savita	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2016	Budzyński	Y	Y	Y	Y	N	N	N	N	Y	N	Y	NR	NA	N	Fair
2016	Felder	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2016	Gartner	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2016	Inoue	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2016	Izawa	Y	Y	NR	Y	N	N	N	N	Y	N	Y	NR	NA	N	Fair
2016	Rossi	Y	Y	Y	Y	N	N	N	N	Y	N	Y	NR	NA	N	Fair
2016	Shakersain	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2017	Hosseini	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2017	Kunimura	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NR	NA	N	Fair
2017	Yoo	Y	Y	Y	Y	N	N	N	N	Y	N	Y	NR	NA	N	Poor

[1] Quality of included studies was assessed using the National Institutes of Health (NIH) Quality Assessment tool for Observational Cohort and Cross-Sectional Studies (https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort). CK 1. Was the research question or objective in this paper clearly stated? CK 2. Was the study population clearly specified and defined? CK 3. Was the participation rate of eligible persons at least 50%? CK 4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? CK 5. Was a sample size justification, power description, or variance and effect estimates provided? CK 6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? CK 7. Was the timeframe sufficient so that one could

reasonably expect to see an association between exposure and outcome if it existed? CK 8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)? CK 9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? CK 10. Was the exposure(s) assessed more than once over time? CK 11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? CK 12. Were the outcome assessors blinded to the exposure status of participants? CK 13. Was loss to follow-up after baseline 20% or less? CK 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)? CK, check list; CD, cannot be determined; NA, not applicable; NR, not reported; N, no; Y, yes.

Supplementary Table S3. Mean biomarker levels in 2 subgroups of malnutrition risk status defined by MNA, excluded patients with acute disease[1]

			MNA > 23.5 (No Risk)	MNA ≤ 23.5 (At Risk)	Stats	I^2
Marker (Units)	**References**	**n**	**Mean (95% CI)**	**Mean (95% CI)**		
BMI (kg/m^2)	[1-29]	6141	27.03 (26.17, 27.90)	23.91 (22.99, 24.84)	P<0.001	94.37%
Albumin (g/dL)	[1-4,6,8-19,21-28,30-39]	8629	3.89 (3.74, 4.05)	3.63 (3.46, 3.80)	p<0.01	99.43%
Hemoglobin (g/dL)	[1,3-7,9,10,12,13,17,21,22,24,25,29,31-33,36,37,39,40]	5981	13.12 (12.73, 13.50)	12.52 (12.12, 12.92)	p<0.05	96.83%
Total Cholesterol (mg/dL)	[2,4,6,9-13,16,17,19,25,26,29,31-33,35,37,39]	4797	189.31 (180.05, 198.57)	178.86 (169.40, 188.32)	p<0.1	95.25%
Total Lymphocyte (10^3/μL)	[4,7,9,10,12,15-17,19-21,25,26,28,32,33,38]	2874	1.97 (1.72, 2.21)	1.76 (1.50, 2.02)	ns	96.29%
Transferrin (mg/dL)	[4,9,10,17,19,20,26,30,31,33,35,40]	3094	269.45 (231.04, 307.85)	263.34 (213.99, 312.69)	ns	99.07%
Prealbumin (mg/dL)	[3,4,6,9,10,12,13,20,26,30,34,35]	2929	23.97 (22.37, 25.57)	21.32 (19.61, 23.03)	p<0.05	92.70%
C-reactive Protein (mg/L)	[2-4,6,11,13,23,35,36]	2360	39.80 (9.56, 70.03)	54.59 (24.18, 84.99)	ns	99.69%
Creatinine (μmol/L)	[2,5,10,11,13,29,30,33,35]	2736	103.95 (96.76, 111.14)	105.60 (97.21, 114.00)	ns	80.82%
Total Protein (g/dL)	[4,11,13,19,24-26,32,35,36,39]	2243	6.96 (6.60, 7.32)	6.75 (6.41, 7.10)	ns	97.36%
Triglycerides (mg/dL)	[2,6,11-13,29,31,35]	1972	131.27 (117.91, 144.64)	124.79 (111.45, 138.13)	ns	83.10%
Iron (μg/dL)	[6,21,31,39,40]	1026	77.26 (56.13, 98.40)	61.31 (20.68, 101.94)	ns	95.44%
White Blood Cells (10^3/μL)	[4,11,13,25,33,37]	1940	8.12 (5.47, 10.77)	8.39 (5.96, 10.82)	ns	98.46%
Hematocrit (%)	[4,17,22,29,37,40]	1292	41.30 (38.11, 44.50)	39.96 (35.22, 44.70)	ns	96.25%
eGFR (mL/min/1.73 m^2)	[2,3,6]	861	58.94 (50.64, 67.24)	56.84 (48.80, 64.88)	ns	6.52%
Blood Urea Nitrogen (mmol/L)	[11,13,29,30]	1610	7.94 (6.58, 9.30)	8.12 (6.73, 9.52)	ns	86.92%
Low-density Lipoprotein (mg/dL)	[2,3,11,29]	788	107.87 (101.35, 114.38)	105.50 (98.06, 112.95)	ns	15.06%
High-density Lipoprotein (mg/dL)	[2,6,25,29]	672	50.20 (38.67, 61.74)	49.83 (37.31, 62.35)	ns	86.98%

[1] Predicted mean for subjects of age 72 years old and 50% are female based on multivariate meta-regression analysis controlling for age and gender. Statistics (Stats) shows p-values by t-test comparing mean values of at risk (AR) group to that of no risk (NR). eGFR, estimated glomerular filtration rate; ns, non-significant.

Supplementary Table S4. Mean biomarker levels in 2 subgroups of malnutrition risk status defined by MNA, included patients with acute disease[1]

			MNA > 23.5 (No Risk)	MNA ≤ 23.5 (At Risk)	Stats	I^2
Marker (Units)	**References**	**n**	**Mean (95% CI)**	**Mean (95% CI)**		
BMI (kg/m^2)	[1-29,41-45]	6429	27.13 (26.32, 27.95)	24.08 (23.23, 24.93)	p<0.001	93.57%
Albumin (g/dL)	[1-4,6,8-19,21-28,30-39,41-46]	9323	3.86 (3.70, 4.01)	3.61 (3.45, 3.77)	p<0.01	99.40%
Hemoglobin (g/dL)	[1,3-7,9,10,12,13,17,21,22,24,25,29,31-33,36,37,39,40,42,45]	6454	13.03 (12.65, 13.41)	12.45 (12.06, 12.84)	p<0.05	96.81%
Total Cholesterol (mg/dL)	[2,4,6,9-13,16,17,19,25,26,29,31-33,35,37,39,41]	4928	189.00 (179.80, 198.20)	177.20 (168.11, 186.29)	p<0.1	95.15%
Total Lymphocyte (10^3/μL)	[4,7,9,10,12,15-17,19-21,25,26,28,32,33,38,41,46]	3109	1.93 (1.70, 2.16)	1.78 (1.54, 2.01)	ns	95.93%
Transferrin (mg/dL)	[4,9,10,17,19,20,26,30,31,33,35,40,42,44]	3183	268.06 (233.05, 303.06)	262.14 (217.84, 306.45)	ns	98.77%
Prealbumin (mg/dL)	[3,4,6,9,10,12,13,20,26,30,34,35,46]	3033	23.71 (21.81, 25.62)	21.29 (19.24, 23.34)	p<0.05	94.96%
C-reactive Protein (mg/L)	[2-4,6,11,13,23,35,36,42,44,45]	2751	34.13 (9.46, 58.81)	49.42 (23.07, 75.78)	ns	99.61%
Creatinine (μmol/L)	[2,5,10,11,13,29,30,33,35,42]	2776	104.31 (97.15, 111.46)	105.29 (96.98, 113.60)	ns	78.45%
Total Protein (g/dL)	[4,11,13,19,24-26,32,35,36,39,41,42]	2414	6.95 (6.62, 7.27)	6.75 (6.46, 7.03)	ns	96.68%
Triglycerides (mg/dL)	[2,6,11-13,29,31,35,41]	2103	131.88 (116.11, 147.64)	118.32 (103.52, 133.12)	ns	90.33%
Iron (μg/dL)	[6,21,31,39,40,42]	1066	77.54 (60.29, 94.79)	59.09 (29.31, 88.88)	ns	93.32%
White Blood Cells (10^3/μL)	[4,11,13,25,33,37,41]	2071	8.03 (5.81, 10.26)	8.25 (6.43, 10.08)	ns	97.83%
Hematocrit (%)	[4,17,22,29,37,40,42,45]	1634	41.80 (38.40, 45.20)	42.17 (37.55, 46.78)	ns	97.25%

[1] Predicted mean for subjects of age 72 years old and 50% are female based on multivariate meta-regression analysis controlling for age and gender. Statistics (Stats) shows p-values by t-test comparing mean values of at risk (AR) group to that of no risk (NR). ns, non-significant.

Supplementary Table S5. Mean biomarker levels in 2 subgroups of malnutrition risk status defined by SGA[1]

			SGA A (No Risk)	SGA B/C (At Risk)	Stats	I^2
Marker (units)	**References**	**n**	**Mean (95% CI)**	**Mean (95% CI)**		
Non-acute Patients Only						
BMI (kg/m^2)	[15,47-59]	2915	26.48 (24.80, 28.16)	21.81 (20.39, 23.22)	p<0.001	95.60%
Albumin (g/dL)	[15,34,47-63]	4685	3.70 (3.48, 3.92)	3.33 (3.12, 3.53)	p<0.01	98.25%
Hemoglobin (g/dL)	[47,50,51,60-63]	1666	12.80 (11.42, 14.18)	11.32 (10.10, 12.55)	p<0.1	97.92%
Total Cholesterol (mg/dL)	[47,49,50,52,56,59,61]	1466	196.66 (176.33, 216.98)	168.09 (151.62, 184.56)	p<0.01	92.38%
Total Lymphocyte (10^3/μL)	[15,47,48,51,56,59,61,62]	1691	1.54 (0.86, 2.12)	1.18 (0.63, 1.74)	ns	97.57%
Prealbumin (mg/dL)	[34,48,53,64,65]	1588	21.68 (15.82, 27.54)	16.49 (10.65, 22.33)	ns	98.37%
C-reactive Protein (mg/L)	[48,49,51,56,59]	1530	104.04 (21.60, 186.48)	82.01 (21.84, 142.18)	ns	94.25%
Total Protein (g/dL)	[47,49-51]	970	6.54 (5.14, 7.93)	5.83 (4.80, 6.87)	p<0.1	93.69%
Included Acute Patients						
BMI (kg/m^2)	[15,43,47-59,66-70]	3497	26.50 (25.26, 27.75)	21.68 (20.62, 22.74)	p<0.001	94.64%
Albumin (g/dL)	[15,34,43,47-63,66-72]	5909	3.62 (3.39, 3.84)	3.25 (3.05, 3.45)	p<0.01	98.69%
Hemoglobin (g/dL)	[47,50,51,60-63,67]	1714	12.81 (11.51, 14.12)	11.27 (10.14, 12.40)	p<0.05	97.63%
Total Lymphocyte (10^3/μL)	[15,47,48,51,56,59,61,62,67]	1739	1.52 (0.84, 2.21)	1.09 (0.55, 1.63)	ns	97.72%
Prealbumin (mg/dL)	[34,48,53,64,65,67,72]	1755	20.71 (16.05, 25.36)	15.95 (11.60, 20.30)	ns	97.75%
C-reactive Protein (mg/L)	[48,49,51,56,59,67,68]	1702	100.73 (32.35, 169.11)	84.36 (34.40, 134.32)	ns	92.84%
Total Protein (g/dL)	[47,49-51,68]	1094	6.53 (4.74, 8.32)	5.79 (4.44, 7.15)	p<0.1	96.46%

[1] Predicted mean for subjects of age 72 years old and 50% are female based on multivariate meta-regression analysis controlling for age and gender. Statistics (Stats) shows p-values by t-test comparing mean values of at risk (AR) group to that of no risk (NR). ns, non-significant.

Supplementary Table S6. Mean biomarker levels in 2 subgroups of malnutrition risk status defined by MNA-SF[1]

			MNA-SF > 11 (No Risk)	MNA-SF ≤ 11 (At Risk)	Stats	I^2
Marker (Units)	**References**	**n**	**Mean (95% CI)**	**Mean (95% CI)**		
Non-acute Patients Only						
BMI (kg/m²)	[5,73-78]	5380	26.79 (24.39, 29.20)	23.49 (20.94, 26.04)	p<0.05	99.09%
Albumin (g/dL)	[73-80]	7869	3.89 (3.58, 4.20)	3.66 (3.32, 4.00)	ns	99.76%
Hemoglobin (g/dL)	[5,73-75,77-80]	6672	13.11 (12.54, 13.67)	12.24 (11.59, 12.89)	p<0.05	98.76%
Total Lymphocyte (10^3/μL)	[41,73,75,80]	556	1.81 (0.47, 3.15)	1.62 (0.22, 3.21)	ns	86.72%
Creatinine (μmol/L)	[5,76,79]	2992	103.47 (38.71, 168.23)	133.89 (-126.78, 394.56)	ns	89.22%
Included Acute Patients						
BMI (kg/m²)	[5,41,43,73-78,81-83]	6025	27.65 (25.84, 29.46)	24.50 (22.64, 26.36)	p<0.01	98.74%
Albumin (g/dL)	[41,43,73-83]	8696	3.79 (3.55, 4.03)	3.62 (3.37, 3.87)	ns	99.60%
Hemoglobin (g/dL)	[5,41,73-75,77-80,82]	7078	13.02 (12.53, 13.52)	12.15 (11.61, 12.70)	p<0.05	98.58%
Total Cholesterol (mg/dL)	[41,76,79,82]	3348	189.23 (169.01, 209.45)	163.77 (141.75, 185.78)	p<0.1	94.33%
Total Lymphocyte (10^3/μL)	[41,73,75,80]	687	1.82 (1.51, 2.11)	1.62 (1.29, 1.96)	ns	71.34%
Creatinine (μmol/L)	[5,76,79,82]	3267	105.70 (83.70, 127.70)	137.70 (86.82, 188.59)	ns	86.38%

[1] Predicted mean for subjects of age 72 years old and 50% are female based on multivariate meta-regression analysis controlling for age and gender. Statistics (Stats) shows p-values by t-test comparing mean values of at risk (AR) group to that of no risk (NR). ns, non-significant.

Supplementary Table S7. Mean biomarker levels in 2 subgroups of malnutrition risk status defined by GNRI[1]

			GNRI > 98 (No Risk)	GNRI ≤ 98 (At Risk)	Stats[b]	I^2
Marker (Units)	**References**	**n**	**Mean (95% CI)**	**Mean (95% CI)**		
Non-acute Patients Only						
BMI (kg/m^2)	[10,84-89]	4995	25.54 (23.44, 27.64)	22.50 (19.73, 25.28)	p<0.001	93.56%
Albumin (g/dL)	[10,84-89]	4995	4.15 (3.94, 4.36)	3.53 (3.26, 3.81)	p<0.001	96.98%
Total Lymphocyte (10^3/μL)	[10,84,85]	755	1.80 (1.35, 2.25)	1.50 (1.04, 1.96)	p<0.01	0.00%
Prealbumin (mg/dL)	[10,84,85,87]	3410	24.46 (19.84, 29.07)	20.31 (14.60, 26.02)	p<0.01	58.06%
Included Acute Patients						
BMI (kg/m^2)	[10,41,42,84-89]	5164	28.06 (26.52, 29.61)	25.05 (23.06, 27.04)	p<0.01	95.66%
Albumin (g/dL)	[10,41,42,84-89]	5164	3.85 (3.64, 4.07)	3.15 (2.87, 3.42)	p<0.001	98.99%
Hemoglobin (g/dL)	[10,41,42,88]	1065	12.29 (11.37, 13.22)	11.34 (10.14, 12.55)	ns	82.78%
Total Lymphocyte (10^3/μL)	[10,41,84,85]	886	1.87 (1.56, 2.19)	1.65 (1.32, 1.99)	p<0.1	60.81%
Transferrin (mg/dL)	[10,42,85]	616	213.98 (177.33, 250.63)	187.83 (150.33, 225.34)	p<0.01	0.00%
Prealbumin (mg/dL)	[10,41,84,85,87]	3541	13.45 (9.74, 17.16)	6.84 (2.89, 10.79)	p<0.01	92.82%

[1] Predicted mean for subjects of age 72 years old and 50% are female based on multivariate meta-regression analysis controlling for age and gender. Statistics (Stats) shows p-values by t-test comparing mean values of at risk (AR) group to that of no risk (NR). ns, non-significant.

Supplementary Table S8. PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1, 2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	NA
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2, 3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	2, 3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3, Table S6
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3, Fig 1.
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3

Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	3
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	3
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	3, 4
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	3
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	4, Fig. 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	4, Table 1-5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Table S8
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Table 1-5, Fig. S1-4
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	5, Table 1-5,
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	6, Figure S5
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	6, 7
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	13, 14
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	14, 15

Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	15
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	15

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For more information, visit: **www.prisma-statement.org**.

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