Supplementary Materials

Prevalence of disease related malnutrition assessed by NRS2002, STAMP, MNA-SF, one-step and two-step GLIM at admission and discharge: A systematic review and meta-analysis

Dongyu Mu MM[1†], Yi Cheng MM[1†], Qi Zhang MM[2], Jie Gong MM[1], Yana Qi MM[3], Jiajie Yu PhD[3], Linan Zeng PhD[4, 5, 6], Lingli Zhang PhD[3, 4, 5, 6], Wen Hu MM[1], Yuan Liu MM[1], Lei Shi MD[1]

[1]*Clinical Nutrition Department, West China Hospital of Sichuan University, Chengdu, Sichuan, China*
[2]*West China School of Medicine, Sichuan University, Chengdu, Sichuan, China*
[3]*Chinese Evidence-based Medicine Center, West China Hospital, Sichuan University, Chengdu, Sichuan, China*
[4]*Department of Pharmacy/Evidence-Based Pharmacy Center, West China Second University Hospital, Sichuan University; Children's Medicine Key Laboratory of Sichuan Province, Chengdu, Sichuan, China*
[5]*NMPA Key Laboratory for Technical Research on Drug Products In Vitro and In Vivo Correlation, Chengdu, Sichuan, China*
[6]*Key Laboratory of Birth Defects and Related Diseases of Women and Children, Sichuan University, Ministry of Education, Chengdu, Sichuan, China*
[†]*Both authors contributed equally to this manuscript*

Corresponding Author:
Prof. Yuan Liu, Clinical Nutrition Department, West China Hospital of Sichuan University, 37 Guoxue Alley, Wuhou District, Chengdu 610041, Sichuan Province, China.
Tel: +86-189-8060-6459.
Email: liu6341@wchscu.cn
Prof. Shi Lei, Clinical Nutrition Department, West China Hospital of Sichuan University, 37 Guoxue Alley, Wuhou District, Chengdu 610041, Sichuan Province, China.
Tel: +86-189-8060-3798.
Email: shileilcyy@wchscu.cn
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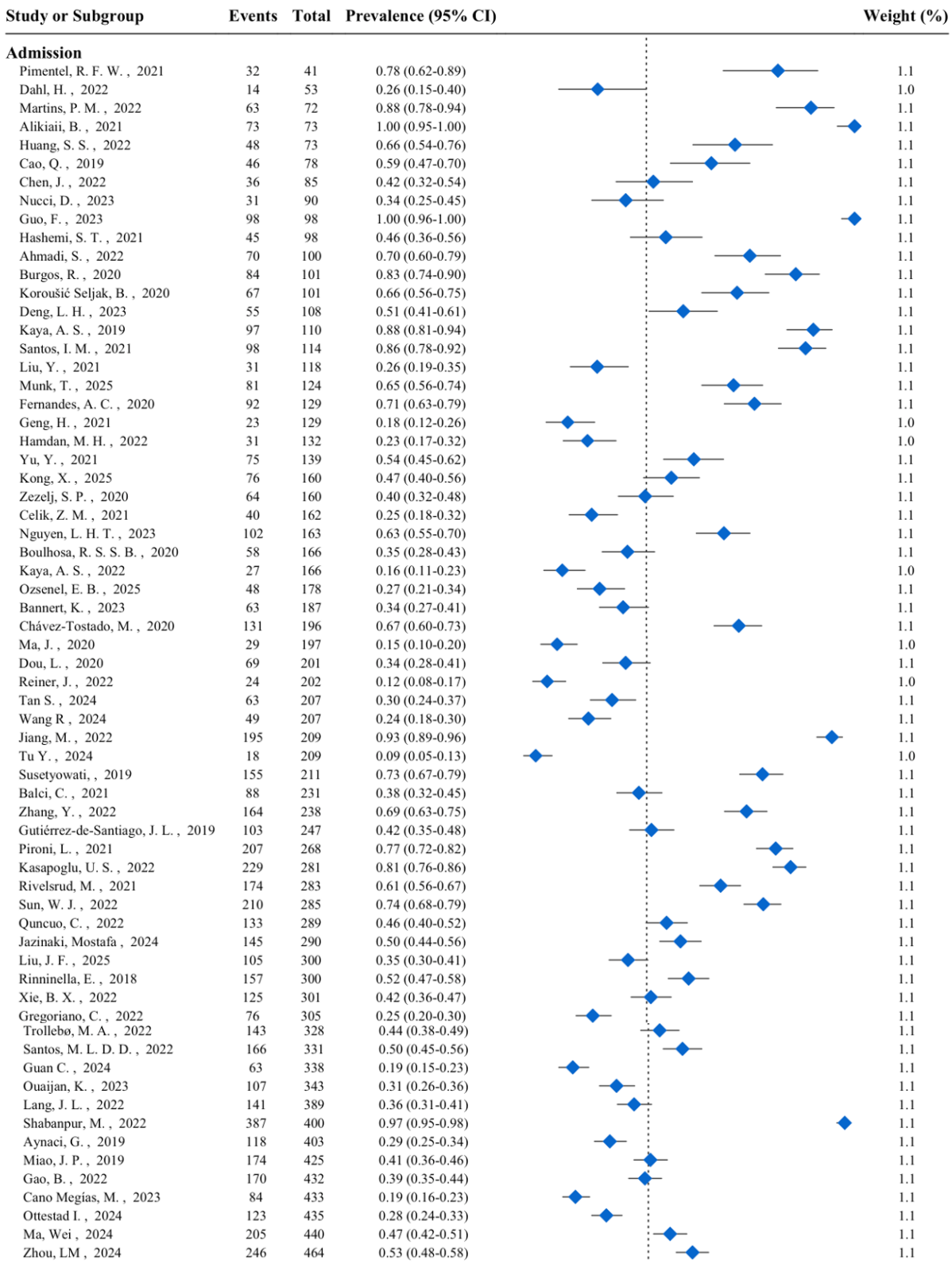
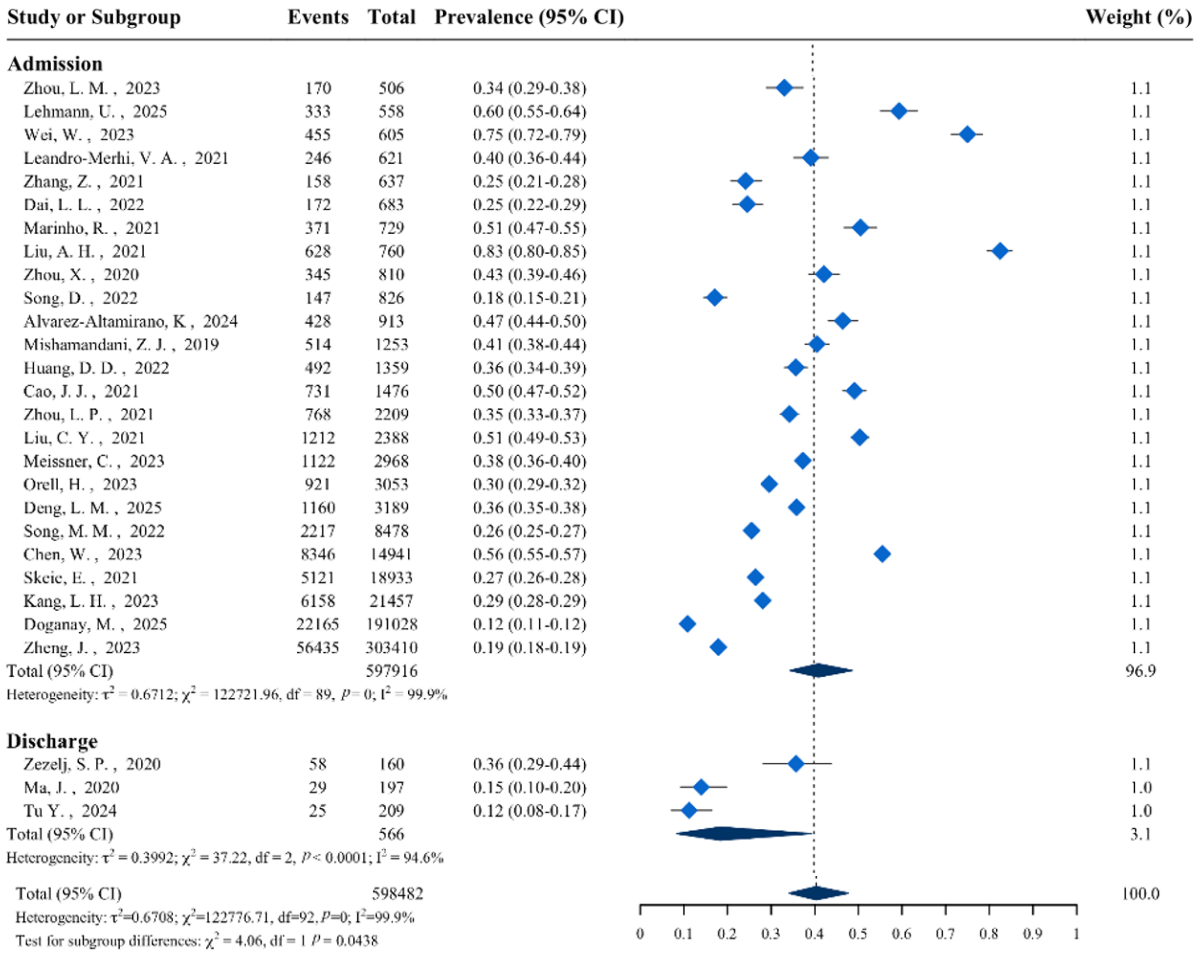
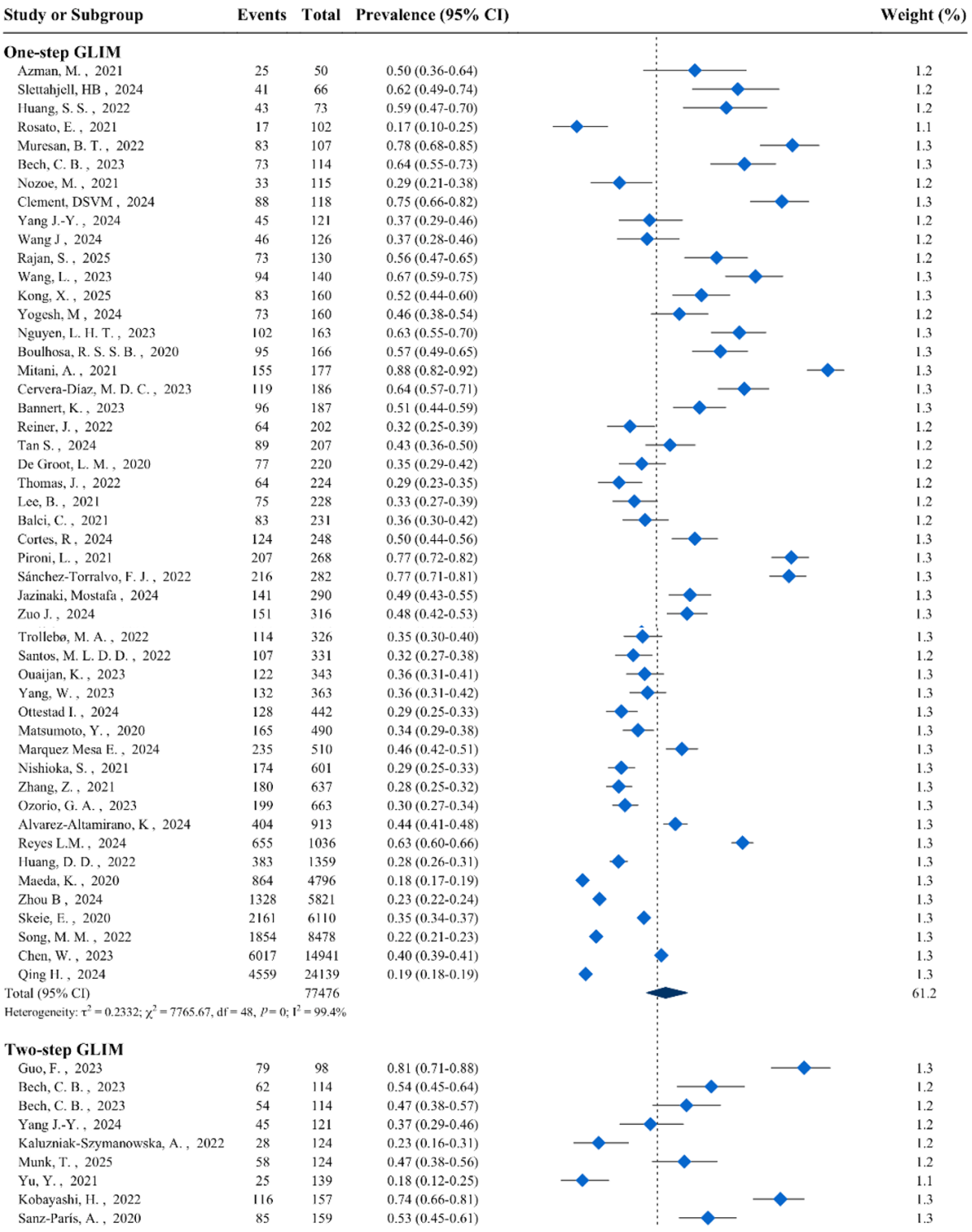


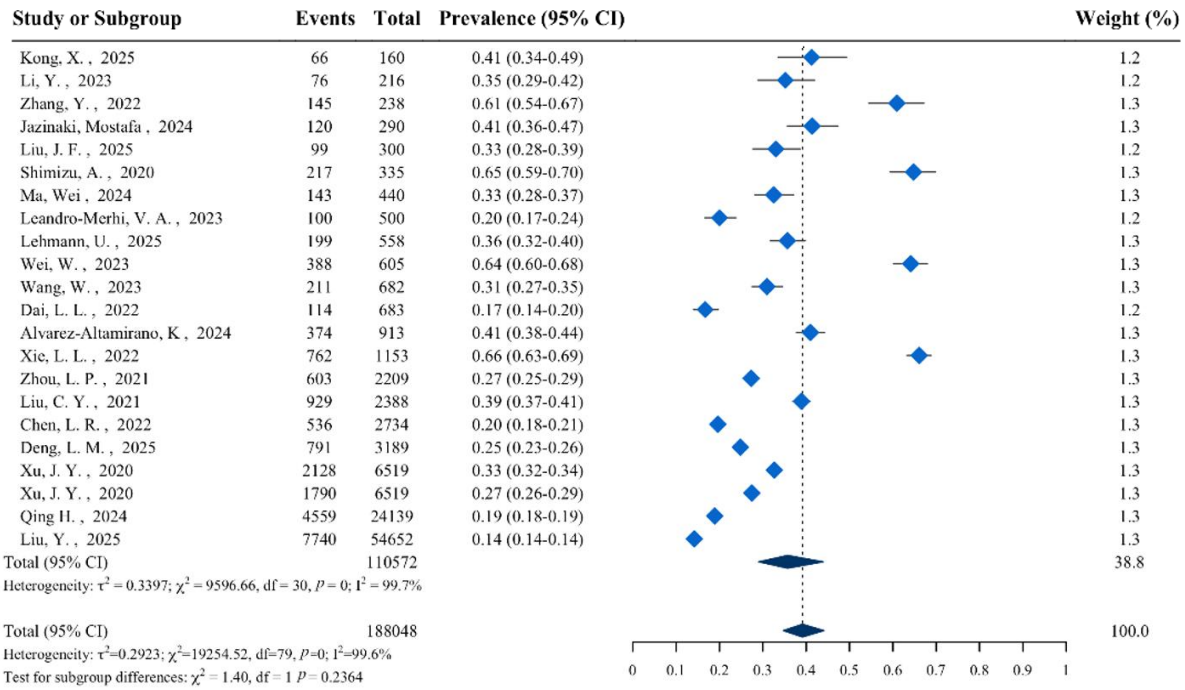
Supplementary Figure 1. Detailed forest plot of NRS2002 prevalence



Supplementary Figure 1. (cont.) Detailed forest plot of NRS2002 prevalence



Supplementary Figure 2. Detailed forest plot of GLIM prevalence



Supplementary Figure 2. (cont.) Detailed forest plot of GLIM prevalence

Supplementary Table 1. Detailed PICOS statement and protocol deviations

1. Comparison of original protocol and final implementation

Item	Original protocol (CRD42023480467)	Final implementation	Justification for deviation (Scientific reason)
Assessment tools	Included NRS2002, MNA-SF, STAMP, SGA, and PG-SGA.	Included NRS2002, MNA-SF, STAMP, and GLIM (Omitted SGA and PG-SGA).	Scope Refinement: To prioritize universal tools (e.g., NRS2002, GLIM) applicable to the general inpatient population. SGA/PG-SGA are primarily tailored for oncology or specialized scenarios, and do not extend the age group coverage or add functional value beyond the selected instrument set.
Databases & language	9 databases (including 4 Chinese); English and Chinese languages.	5 English databases; English language only.	International Comparability: To ensure that all included studies have undergone a broadly standardized international peer-review process, facilitating a more uniform synthesis of global data.
Main outcomes	Screening Rate (Coverage) and Positive Rate (Prevalence).	Prevalence (Positive Rate) only.	Data Quality: Screening rates (coverage) were reported in insufficient studies to support a valid meta-analysis.
Risk of bias tool	AHRQ criteria.	AHRQ criteria and Hoy et al. tool.	Methodological Enhancement: As recommended by current guidelines, the Hoy et al. tool is explicitly validated for prevalence studies, addressing critical items such as sampling frame and representativeness.
Search timeframe	No limitation	From 1 Jan 2018 to 30 Nov 2025	Clinical Standardization: To align with the 2018 global implementation of GLIM criteria and the emergence of national nutrition plans (e.g., in China, Vietnam, and Lebanon). This ensures the meta-analysis reflects contemporary clinical practices.

2. Participants/population

(1) Inclusion: all hospitalized patients, encompassing children (aged 2-17 years), adults (aged 18+ years), and the elderly (aged 65+ years). Patients were grouped based on the populations targeted by different nutrition screening and assessment tools.

(2) Exclusion: the nutrition screening or assessment was not appropriately applied to specific populations, disease spectrums, and scenarios. For instance, inadequate application in infants, pregnant women, outpatients/emergency cases, community settings, nursing homes etc.

3. Intervention(s), exposure(s)

The patients included should have undergone nutrition screening or assessment at the commencement of their admission, ideally within 48 hours (e.g., administering NRS2002), which can be conducted by dietitians, nurses, or physicians.

4. Comparator(s)/control

Not applicable.

5. Main outcome(s)

(1) primary outcomes: NRS2002 positive rate.

(2) secondary outcomes: MNA-SF positive rate, STAMP positive rate, GLIM positive rate.

6. Types of study to be included

(1) Inclusion criteria: cross-sectional studies.

(2) Exclusion criteria: duplicates, editorials, dissertations, books, articles in languages other than English, conference papers, news articles; studies for which full text or nutritional data were not available from databases; studies using alternative designs; non-original studies such as meta-analyses and reviews; studies that are duplicated within the study population (if a series of articles enrolled the same population but reported their results at different times in different journals, only the latest published one or the one with the largest sample size will be selected); non-representative studies such as those lacking clear descriptions of conducting sites.

7. Measures of effect

(1) Positive inpatient nutrition screening rate = total number of inpatients with a positive result on the nutrition screening scale / total number of inpatients screened during the same period × 100%, including NRS2002, MNA-SF, and STAMP positive rate.

(2) Positive inpatient nutrition assessment rate = total number of inpatients with a positive result on the nutrition assessment scale / total number of assessed patients during the same period × 100%, including 1-step GLIM positive rate, NRS2002-GLIM positive rate, MNA-SF-GLIM positive rate.

8. Measures of effect

Prevalence rate (%).

Supplementary Table 2. Search strategy and original results

Database	Query		Results
Embase (OVID)	#1	("malnutrition" OR "nutritional status" OR "nutrition assessment").ti,ab.	4206
	#2	("nutritional deficienc*" OR "undernutrition" OR "malnourishment?").ti,ab.	
	#3	1 OR 2	
	#4	("NRS2002" OR "NRS-2002" OR "NRS 2002") .ti,ab.	
	#5	(("nutrition* risk screening" OR "nutrition* risk score") ADJ5 "2002").ti,ab.	
	#6	4 OR 5	
	#7	("MNA-SF" OR "MNA-short form").ti,ab.	
	#8	(("mini nutritional assessment" OR "mini-nutritional assessment" OR "mini nutrition assessment" OR "MNA") ADJ6 ("short form" OR "short-form" OR "short version")).ti,ab.	
	#9	7 OR 8	
	#10	("STAMP").ti,ab.	
	#11	("screening tool" ADJ10 "assessment" ADJ10 "malnutrition" ADJ10 (“paediatrics" OR “pediatrics”)).ti,ab.	
	#12	10 OR 11	
	#13	("GLIM").ti,ab.	
	#14	(“global leadership initiative").ti,ab.	
	#15	13 OR 14	
	#16	6 OR 9 OR 12 OR 15	
	#17	3 AND 16	
PubMed	(("malnutrition"[mesh] OR "nutritional Status"[mesh] OR "nutrition assessment"[mesh]) OR ("malnutrition"[tiab] OR "nutritional Deficienc*"[tiab] OR "undernutrition"[tiab] OR "malnourishment?"[tiab])) AND ((("NRS2002"[tiab] OR "NRS-2002"[tiab] OR "NRS 2002"[tiab]) OR (("nutrition* risk screening"[tiab] OR "nutrition* risk score"[tiab]) NEAR "2002"[tiab])) OR (("MNA-SF"[tiab] OR "MNA-short form"[tiab]) OR (("mini nutritional assessment"[tiab] OR "mini-nutritional assessment"[tiab] OR "mini nutrition assessment"[tiab] OR "MNA"[tiab]) NEAR ("short form" OR "short-form"[tiab] OR "short version"[tiab]))) OR ("STAMP"[tiab] OR ("screening tool"[tiab] NEAR "assessment"[tiab] NEAR "malnutrition"[tiab] NEAR ("paediatrics"[tiab] OR "pediatrics"[tiab]))) OR ("GLIM"[tiab] OR "global leadership initiative"[tiab])) AND ((Cross-Sectional Studies[MESH:NOEXP] OR Prevalence[MESH:NOEXP] OR "association study"[TIAB:~2] OR "association studies"[TIAB:~2] OR "ecological studies"[TIAB] OR "ecological study"[TIAB] OR cross-sectional[TIAB] OR prevalence[TIAB] OR transversal[TIAB] OR association[TI] OR associations[TI]))		2225
Web of Science (core cellection)	TS=("malnutrition" OR "nutritional status" OR "nutrition assessment" OR "nutritional deficienc*" OR "undernutrition" OR "malnourishment?") AND TS=("NRS2002" OR "NRS-2002" OR "NRS 2002" OR (("nutrition* risk screening" OR "nutrition* risk score") NEAR ("2002")) OR "MNA-SF" OR "MNA-short form" OR (("mini nutritional assessment" OR "mini-nutritional assessment" OR "mini nutrition assessment" OR "MNA") NEAR ("short form" OR "short-form" OR "short version")) OR (("mini nutritional assessment" OR "mini-nutritional assessment" OR "mini nutrition assessment" OR "MNA") NEAR ("short form" OR "short-form" OR "short version")) OR ("STAMP") OR ("screening tool" NEAR "assessment" NEAR "malnutrition" NEAR (“paediatrics" OR “pediatrics”)) OR ("GLIM") OR (“global leadership initiative"))		2890

Supplementary Table 2. Search strategy and original results (cont.)

Database	Query		Results
Cochrane* (OVID)	#1	("malnutrition" OR "nutritional status" OR "nutrition assessment").ti,ab.	132
	#2	("nutritional deficienc*" OR "undernutrition" OR "malnourishment?").ti,ab.	
	#3	1 OR 2	
	#4	("NRS2002" OR "NRS-2002" OR "NRS 2002") .ti,ab.	
	#5	(("nutrition* risk screening" OR "nutrition* risk score") ADJ5 "2002").ti,ab.	
	#6	4 OR 5	
	#7	("MNA-SF" OR "MNA-short form").ti,ab.	
	#8	(("mini nutritional assessment" OR "mini-nutritional assessment" OR "mini nutrition assessment" OR "MNA") ADJ6 ("short form" OR "short-form" OR "short version")).ti,ab.	
	#9	7 OR 8	
	#10	("STAMP").ti,ab.	
	#11	("screening tool" ADJ10 "assessment" ADJ10 "malnutrition" ADJ10 (“paediatrics" OR “pediatrics”)).ti,ab.	
	#12	10 OR 11	
	#13	("GLIM").ti,ab.	
	#14	(“global leadership initiative").ti,ab.	
	#15	13 OR 14	
	#16	6 OR 9 OR 12 OR 15	
	#17	3 AND 16	
	*Including the following databases: EBM Reviews - Cochrane Central Register of Systematic Reviews 2005 to November 15, 2023 EBM Reviews - Cochrane Central Register of Controlled Trials October 2023 EBM Reviews - Cochrane Clinical Answers November 2023 EBM Reviews - Cochrane Methodology Register 3rd Quarter 2012 EBM Reviews - Database of Abstracts of Reviews of Effects 1st Quarter 2016 EBM Reviews - Health Technology Assessment 4th Quarter 2016 EBM Reviews - NHS Economic Evaluation Database 1st Quarter 2016		
CINAHL	S1	("XB malnutrition"[mesh] OR XB "nutritional status"[mesh] OR XB "nutrition assessment"[mesh])	240
	S2	(XB "malnutrition" OR XB "nutritional deficienc*" OR XB "undernutrition" OR XB "malnourishment?")	
	S3	S1 OR S2	
	S4	(XB "NRS2002" OR XB "NRS-2002" OR XB "NRS 2002")	
	S5	((XB "nutrition* risk screening" OR XB "nutrition* risk score") NEAR XB "2002")	
	S6	S4 OR S5	
	S7	(XB "MNA-SF" OR XB "MNA-short form")	
	S8	((XB "mini nutritional assessment" OR XB "mini-nutritional assessment" OR XB "mini nutrition assessment" OR XB "MNA") NEAR (XB "short form" OR XB "short-form" OR XB "short version"))	
	S9	S7 OR S8	
	S10	XB "STAMP"	
	S11	(XB "screening tool" NEAR XB "assessment" NEAR XB "malnutrition" NEAR (XB “paediatrics" OR XB “pediatrics”))	
	S12	S10 OR S11	
	S13	XB "GLIM"	
	S14	XB “global leadership initiative"	
	S15	S13 OR S14	
	S16	S6 OR S9 OR S12 OR S15	
	S17	S3 AND S16	
Total			9693

Supplementary Table 3. Data extraction form

Basic information						
Quartile	First author	Publish year	Journal	Title	Country	Income
City	Hospital	Department	Disease	Hospital level	Study type	screening/assessment tool
Applier	Reporting Language	Data sources	Samples estimation	Samples allocation/sampling method	Time of follow-up	Total participants
Excluded participants	Participants included	Observation start	Endpoint	Funding	Conclusions	Races/Ethnicity
Population						
Age (mean/median)	Age (SD)	Age (IQR)	Age (range)	Gender (male)	Gender (female)	Disease duration
Inclusion criteria	exclusion criteria	Marital Status	life environment	Education level	Living with others	Employed/profession
Comorbidity/Antecedents (detail)	Treatment of comorbidity/Antecedents（detail）	Smokers	Alcohol	Life/diet style	Length of hospitalization	History of hypertension
History of hyperlipidemia	History of coronary heart disease	History of coronary heart failure	History of pulmonary disease	History of malignancy/tumor	History of diabetes	History of obesity
History of anxiety	History of depression	Visceral/abdominal fat mass	Skeletal muscle mass	Chronic renal failure	Stroke	Chronic kidney disease
Data						
Timepoint of data collection	Admission_incidence (%)	Admission_positive patients_n	Admission_samplesize_N	Discharge_incidence (%)	Discharge_positive patients_n	Discharge_samplesize_N
Risk of bias						
Q1. Was the study adequately considered inpatient representation in terms of age, gender, occupation, and other relevant variables?						
Q2. Were the study enrolled inpatients from multiple departments or hospitals?						
Q3. Was some form of random selection used to select the sample, OR, was a census undertaken?						
Q4. Was the likelihood of non-response bias minimal?						
Q5. Were data collected directly from the subjects (as opposed to a proxy)?						
Q6. Was the screening or assessment tool used properly in the study?						
Q7. Was the study instrument that measured the prevalence of malnutrition shown to have reliability and validity (if necessary)?						
Q8. Was the same mode of data collection used subjects?						
Q9. Was the length of the shortest prevalence period for the malnutrition within 72h?						
Q10. Were the numerator(s) and denominator(s) for the malnutrition prevalence appropriate?						
Q11. Summary item on the overall risk of study bias						

Supplementary Table 4. Summary of the risk of bias of included studies

S/no	Name of author	Year	Hoy et al†										AHRQ score‡											
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
1	Acehan, S. [1]	2020	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	1	5
2	Adly, N. N. [2]	2020	1	1	0	0	1	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	1	3
3	Ahmadi, S. [3]	2022	1	1	0	0	1	0	0	0	0	0	2	0	1	1	1	0	0	1	0	0	0	1	5
4	Alamri, A.[4]	2025	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	0	1	1	6
5	Alikiaii, B.[5]	2021	1	1	1	0	0	0	0	0	1	1	3	0	1	1	0	0	0	1	0	0	0	1	4
6	Alvarez-Altamirano, K[6]	2024	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	5
7	Alvarez-Larruy, M.[7]	2023	1	1	1	0	1	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	1	2
8	Aynaci, G.[8]	2019	1	1	1	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0	1	3
9	Azman, M.[9]	2021	1	1	0	0	0	0	1	0	1	0	3	0	1	1	1	1	0	1	0	0	0	1	6
10	Balci, C.[10]	2021	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	1	0	0	0	1	5
11	Bannert, K.[11]	2023	1	0	1	0	0	0	0	0	1	0	2	0	1	1	0	0	0	0	0	0	0	1	3
12	Barros, T. A.[12]	2022	1	0	0	0	0	0	0	0	1	0	1	1	0	1	1	0	0	1	0	0	1	1	6
13	Bech, C. B.[13]	2023	1	1	0	0	1	0	0	0	0	0	2	1	1	1	1	0	0	1	0	0	0	1	6
14	Borges, K.[14]	2022	1	1	1	0	1	0	0	0	1	0	3	0	1	1	0	0	0	0	0	0	0	1	3
15	Boulhosa, R. S. S. B.[15]	2020	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	1	5
16	Burgos, R.[16]	2020	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	4
17	Caliskan, E.[17]	2019	1	1	1	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0	1	3
18	Can, B.[18]	2022	1	1	0	0	0	0	0	0	1	0	2	0	0	1	1	0	0	0	0	0	0	1	3
19	Cano Megías, M.[19]	2023	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	1	4
20	Cao, J. J.[20]	2021	0	1	1	0	0	0	0	0	1	0	2	1	1	0	0	0	1	0	0	0	0	1	4
21	Cao, Q.[21]	2019	1	1	0	0	0	0	0	0	1	0	2	1	1	0	1	0	0	0	0	0	0	1	4
22	Carretero Gómez, J.[22]	2023	1	1	0	0	0	0	0	0	1	0	2	0	1	1	1	0	0	0	0	0	0	1	4
23	Carvalho, J.[23]	2022	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	1	0	0	0	1	5
24	Celik, Z. M.[24]	2021	0	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	1	4
25	Cervera-Díaz, M. D. C.[25]	2023	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	4
26	Chávez-Tostado, M.[26]	2020	1	1	1	0	0	1	0	0	0	0	3	0	1	1	0	0	0	0	0	0	0	1	3
27	Chen, J.[27]	2022	1	1	1	0	0	0	0	0	1	0	3	0	0	1	0	0	1	0	0	0	0	1	3
28	Chen, L. R.[28]	2022	1	0	1	0	0	0	0	0	1	0	2	0	1	1	0	0	0	0	0	0	0	1	3
29	Chen, W.[29]	2023	1	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0	0	1	4
30	Chen, XQ[30]	2023	1	1	1	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	0	0	1	3
31	Clement, DSVM[31]	2024	1	1	0	0	0	0	0	0	1	0	2	0	1	1	1	0	0	0	0	0	0	1	4
32	Çoban, E.[32]	2019	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	0	0	0	0	1	3
33	Cortes, R[33]	2024	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	1	6
34	Dahl, H.[34]	2022	1	1	1	1	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	1	2
35	Dai, L. L.[35]	2022	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	1	4
36	De Groot, L. M.[36]	2020	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	1	0	0	0	0	1	4
37	Deng, L. H.[37]	2023	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	4
38	Deng, L. M.[38]	2025	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	5
39	Doganay, M.[39]	2025	1	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	0	0	0	0	1	4
40	Dou, L.[40]	2020	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	1	6

Supplementary Table 4. Summary of the risk of bias of included studies (cont.)

S/no	Name of author	Year	Hoy et al†										AHRQ score‡											
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
41	Efendioglu, E. M.[41]	2022	1	1	0	0	0	0	0	0	1	0	2	1	0	1	0	0	0	0	0	0	0	1	3
42	Elif Öztürk, M.[42]	2023	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	1	1	0	0	0	0	1	6
43	Fernandes, A. C.[43]	2020	1	1	0	0	0	0	0	0	1	0	2	1	1	1	1	0	0	1	0	0	0	1	6
44	Fukui, S.[44]	2020	1	1	0	1	1	0	0	0	1	0	3	0	1	1	1	0	0	0	1	0	0	1	5
45	Gao, B.[45]	2022	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	0	0	0	1	8
46	Genest, F.[46]	2021	1	1	1	0	0	0	0	0	1	0	3	1	1	0	0	0	0	1	0	0	0	1	4
47	Geng, H.[47]	2021	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	1	0	0	0	0	1	4
48	Godala, M[48]	2024	1	1	1	0	0	0	0	0	1	0	3	0	0	0	0	0	1	0	0	0	0	1	2
49	Gómez-Uranga, A.[49]	2022	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	0	1	0	0	1	4
50	Gregoriano, C.[50]	2022	1	1	0	1	0	0	0	0	0	0	2	1	1	1	1	0	0	1	1	0	0	1	7
51	Guan C.[51]	2024	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	0	0	0	0	1	4
52	Guo, F.[52]	2023	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	0	0	0	0	1	3
53	Gutiérrez-de-Santiago, J. L.[53]	2019	1	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	3
54	Hamdan, M. H.[54]	2022	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	1	0	0	1	1	5
55	Hashemi, S. T.[55]	2021	1	1	1	0	0	0	0	0	0	1	3	0	1	1	0	0	1	0	0	0	0	1	4
56	Huang, D. D.[56]	2022	1	1	0	0	0	0	0	0	1	0	2	0	1	1	1	0	0	0	0	0	0	1	4
57	Huang, S. S.[57]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	1	4
58	Jazinaki, Mostafa[58]	2024	1	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
59	Jiang, M.[59]	2022	1	1	1	0	0	0	0	0	1	0	3	0	0	1	0	0	1	0	0	0	0	1	3
60	Kaluzniak-Szymanowska, A.[60]	2022	1	1	0	0	0	0	0	0	1	0	2	0	1	1	0	0	1	0	0	0	0	1	4
61	Kang, L. H.[61]	2023	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	2
62	Kasapoglu, U. S.[62]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	0	1	1	0	0	1	6
63	Kaya, A. S.[63]	2020	1	1	1	0	0	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	0	1	2
64	Kaya, A. S.[64]	2022	1	1	1	0	0	0	0	0	1	0	3	0	0	1	0	0	0	0	0	0	0	1	2
65	Kaya, D. G.[65]	2023	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	3
66	Kaźmierczak-Siedlecka, K.[66]	2020	1	1	1	0	0	0	0	0	1	0	3	0	0	0	0	0	0	1	0	0	0	1	2
67	Kobayashi, H.[67]	2022	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	1	7
68	Kong, X.[68]	2025	1	1	1	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	1	0	0	1	4
69	Koroušić Seljak, B.[69]	2020	1	1	0	0	1	0	0	0	1	0	3	1	1	1	1	0	1	0	0	0	0	1	6
70	Kumar, S.[70]	2025	0	1	1	0	1	0	0	1	1	0	3	0	1	1	0	0	0	0	0	0	0	1	3
71	Lai, X. X.[71]	2020	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	6
72	Lang, J. L.[72]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	0	0	0	1	0	0	0	0	1	4
73	Leandro-Merhi, V. A.[73]	2021	1	1	1	0	0	0	0	0	0	0	2	1	1	1	1	0	0	0	0	0	0	1	5
74	Leandro-Merhi, V. A.[74]	2023	1	1	1	0	0	0	0	0	0	1	3	1	1	0	0	0	0	0	0	0	0	1	3
75	Lee, B.[75]	2021	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1	4
76	Lehmann, U.[76]	2025	1	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0	0	0	0	1	5
77	Li, Y.[77]	2023	1	1	1	0	1	0	0	0	0	0	3	1	1	1	1	0	1	0	1	0	0	1	7
78	Liu, A. H.[78]	2021	0	1	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0	1	1	0	0	1	7
79	Liu, C. Y.[79]	2021	1	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0	0	1	4
80	Liu, H.[80]	2021	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	0	1	7
81	Liu, J. F.[81]	2025	1	1	0	0	0	0	0	0	0	1	2	1	1	1	1	0	0	0	0	0	1	1	6
82	Liu, X.[82]	2021	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	1	0	0	1	5

Supplementary Table 4. Summary of the risk of bias of included studies (cont.)

S/no	Name of author	Year	Hoy et al†											AHRQ score‡										
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
83	Liu, Y.[83]	2021	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	0	0	0	0	1	3
84	Liu, Y.[84]	2025	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	1	1	1	0	0	1	8
85	Lueg, G.[85]	2020	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	0	1	7
86	Ma, J.[86]	2020	0	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	6
87	Ma, Wei[87]	2024	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	1	1	1	1	1	0	1	9
88	Maeda, K.[88]	2020	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	1	0	0	0	1	5
89	Makwana, N. R.[89]	2019	0	1	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	3
90	Marinho, R.[90]	2021	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	1	7
91	Marquez Mesa E. [91]	2024	1	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0	0	1	4
92	Martins, P. M.[92]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	1	1	0	0	1	7
93	Matsumoto, Y.[93]	2020	1	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	1	5
94	Meissner, C.[94]	2023	1	0	1	0	0	0	0	0	1	0	2	0	0	1	0	0	0	0	0	0	0	1	2
95	Mercan Baspinar M.[95]	2024	0	1	1	0	0	0	0	0	0	0	3	1	1	1	0	0	1	0	1	0	0	1	6
96	Miao, J. P.[96]	2019	1	0	1	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	0	1	7
97	Mishamandani, Z. J.[97]	2019	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	1	4
98	Mitani, A.[98]	2021	1	1	1	0	0	0	0	0	1	0	3	0	1	1	1	0	0	1	0	0	0	1	5
99	Mphwanthe G.[99]	2025	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	0	0	1	8
100	Munk, T.[100]	2025	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1	0	0	0	1	5
101	Muresan, B. T.[101]	2022	1	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	0	0	0	0	1	5
102	Naaman, R. K.[102]	2023	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	6
103	Nguyen, L. H. T.[103]	2023	1	1	1	0	1	0	0	0	0	0	3	0	1	1	0	0	0	0	1	0	0	1	4
104	Nishioka, S.[104]	2021	1	1	0	0	0	0	0	0	1	0	2	1	0	1	1	0	1	0	1	0	0	1	6
105	Nozawa, Y.[105]	2023	1	1	1	0	0	0	0	0	1	0	3	0	0	1	0	0	0	1	0	0	0	1	3
106	Nozoe, M.[106]	2021	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	1	1	0	0	1	6
107	Nucci, D.[107]	2023	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0	0	1	7
108	Oguri, M.[108]	2022	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	1	0	1	0	0	1	6
109	Omar O.M.[109]	2024	0	0	1	0	0	0	0	0	1	0	1	0	1	1	1	0	1	0	0	0	0	1	5
110	Oner O.[110]	2024	1	1	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	1	3
111	Ong, S. H.[111]	2019	0	1	0	0	1	0	0	0	1	0	2	1	1	1	0	0	1	0	0	0	0	1	5
112	Orell, H.[112]	2023	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	1	1	0	0	1	6
113	Ostrowska, J. M.[113]	2019	1	1	1	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	1	2
114	Ottestad I.[114]	2024	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	0	0	1	6
115	Ouaijan, K.[115]	2023	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	1	6
116	Ozorio, G. A.[116]	2023	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	1	6
117	Ozsenel, E. B.[117]	2025	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
118	Pham Thi Lan A.[118]	2024	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
119	Pimentel, R. F. W.[119]	2021	1	1	1	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	1	2
120	Pironi, L.[120]	2021	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	4
121	Polat, O.[121]	2022	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0	1	1	7
122	Poveda, M. D.[122]	2023	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	1	3
123	Qing H.[123]	2024	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	1	0	0	1	6
124	Quncuo, C.[124]	2022	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	3

Supplementary Table 4. Summary of the risk of bias of included studies (cont.)

S/no	Name of author	Year	Hoy et al†										AHRQ score‡											
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
125	Rajan, S.[125]	2025	1	0	1	0	0	0	0	0	1	0	2	0	1	0	1	0	0	0	1	0	0	1	4
126	Reiner, J.[126]	2022	1	1	1	0	0	0	0	0	1	0	3	1	0	1	0	0	0	0	0	0	0	1	3
127	Reyes L.M.[127]	2024	1	1	0	0	0	0	0	0	1	0	2	1	0	1	0	0	0	0	1	0	0	1	4
128	Rinninella, E.[128]	2018	1	1	1	0	0	0	0	0	0	0	2	0	1	1	1	0	1	0	1	0	0	1	6
129	Rivelsrud, M.[129]	2021	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	1	0	0	1	5
130	Rosato, E.[130]	2021	1	1	0	0	0	0	0	0	1	0	2	1	1	1	1	0	0	0	0	0	0	1	5
131	Ruiz-Rosso R[131]	2024	0	1	0	0	1	0	0	0	0	0	1	1	1	1	0	0	1	1	1	0	0	1	7
132	Sánchez-Torralvo, F. J.[132]	2022	1	1	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	1	0	0	0	1	4
133	Santos, I. M.[133]	2021	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	1	0	0	0	0	1	5
134	Santos, M. L. D. D.[134]	2022	1	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	1	4
135	Sanz-París, A.[135]	2020	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0	0	0	1	5
136	Shabanpur, M.[136]	2022	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	1	0	1	0	0	1	5
137	Shimizu, A.[137]	2020	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	6
138	Silva RJG[138]	2023	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	0	0	0	0	1	4
139	Skeie, E.[139]	2020	1	1	0	0	0	0	0	0	1	0	2	1	1	1	0	0	0	1	1	0	0	1	6
140	Skeie, E.[140]	2021	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0	0	1	6
141	Slettahjell, HB[141]	2024	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	1	1	0	0	0	1	5
142	Song, D.[142]	2022	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	1	5
143	Song, M. M.[143]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	1	0	0	0	1	4
144	Sun, W. J.[144]	2022	1	1	1	0	0	0	0	0	1	0	3	0	1	1	0	0	0	0	1	0	0	1	4
145	Susetyowati,[145]	2019	1	1	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	1	3
146	Tan S.[146]	2024	1	1	1	0	0	0	0	0	0	0	2	0	0	1	0	0	1	0	1	0	0	1	4
147	Thiam, C. N.[147]	2022	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	0	1	5
148	Thomas, J.[148]	2022	1	1	1	1	0	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	1	4
149	Thomsen, T. K.[149]	2023	1	0	1	0	0	0	0	0	1	0	2	1	1	1	1	0	0	0	0	1	0	1	6
150	Tran, T. P.[150]	2021	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	1	1	0	0	1	7
151	Trollebø, M. A.[151]	2022	0	1	1	0	0	0	0	0	1	0	2	1	1	1	0	0	0	1	0	0	0	1	5
152	Tu Y.[152]	2024	0	1	1	1	0	0	0	0	0	0	2	1	1	1	0	0	1	1	0	0	0	1	6
153	Wang J[153]	2024	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	1	5
154	Wang R[154]	2024	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
155	Wang, J. J.[155]	2023	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	0	1	0	0	0	1	5
156	Wang, L.[156]	2023	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	1	6
157	Wang, W.[157]	2023	1	1	1	0	1	0	0	0	0	0	3	1	1	1	0	0	1	0	1	0	0	1	6
158	Wei, W.[158]	2023	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	1	1	0	0	1	6
159	Xie, B. X.[159]	2022	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	1	5
160	Xie, L. L.[160]	2022	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	1	1	1	0	0	1	8
161	Xu, J. Y.[161]	2020	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	0	1	7
162	Xu, L. B.[162]	2022	1	1	0	0	0	0	0	0	1	0	2	1	0	1	1	0	0	1	1	0	0	1	6
163	Yang J.-Y.[163]	2024	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	0	1	0	0	0	1	5
164	Yang, W.[164]	2023	1	1	0	0	0	0	0	0	1	0	2	0	1	1	1	0	1	0	1	0	0	1	6
165	Yang, W.[165]	2023	1	1	1	0	0	0	0	0	1	0	3	1	1	0	0	0	0	0	0	0	0	1	3
166	Yogesh, M[166]	2024	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	1	1	0	0	1	6

Supplementary Table 4. Summary of the risk of bias of included studies (cont.)

S/no	Name of author	Year	Hoy et al†											AHRQ score‡										
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
167	Yu, Y.[167]	2021	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	1	0	1	0	0	1	6
168	Yuksel, B.[168]	2022	1	0	1	0	0	0	0	0	1	0	2	1	1	1	0	0	1	0	0	0	0	1	5
169	Zezelj, S. P.[169]	2020	1	1	1	0	0	0	0	0	0	1	3	0	1	1	0	0	1	0	0	0	0	1	4
170	Zhang, Q.[170]	2022	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
171	Zhang, Y.[171]	2022	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	0	1	7
172	Zhang, Z.[172]	2021	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	0	1	6
173	Zheng, J.[173]	2023	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	0	0	0	0	1	5
174	Zhou B[174]	2024	0	0	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	0	0	1	6
175	Zhou, L. M.[175]	2023	1	1	1	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	1	5
176	Zhou, L. P.[176]	2021	1	1	1	0	0	0	0	0	1	0	3	1	1	1	0	0	0	0	1	0	0	1	5
177	Zhou, LM[177]	2024	1	1	1	0	0	0	0	0	0	0	2	1	0	1	0	0	1	1	1	0	0	1	6
178	Zhou, X.[178]	2020	1	1	1	0	0	0	0	0	0	0	2	1	1	1	1	0	1	1	0	0	1	1	8
179	Zuo J.[179]	2024	1	1	0	0	0	0	0	0	1	0	2	0	1	1	1	0	0	0	1	0	0	1	5

†Q1 to Q10: 1= No (HIGH RISK), 0 = Yes (LOW RISK)
Q1. Was the study adequately considered inpatient representation in terms of age, gender, occupation, and other relevant variables?
Q2. Were the study enrolled inpatients from multiple departments or hospitals?
Q3. Was some form of random selection used to select the sample, OR, was a census undertaken?
Q4. Was the likelihood of non-response bias minimal?
Q5. Were data collected directly from the subjects (as opposed to a proxy)?
Q6. Was the screening or assessment tool used properly in the study?
Q7. Was the study instrument that measured the prevalence of malnutrition shown to have reliability and validity (if necessary)?
Q8. Was the same mode of data collection used subjects?
Q9. Was the length of the shortest prevalence period for the malnutrition within 72h?
Q10. Were the numerator(s) and denominator(s) for the malnutrition prevalence appropriate?
Q11. Summary item on the overall risk of study bias (Abbreviation of Q11: 1= LOW RISK OF BIAS, 2 = MODERATE RISK OF BIAS, 3 = HIGH RISK OF BIAS)
Reference: Hoy D, Brooks P, Woolf A et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J Clin Epidemiol. 2012;65:934–39. doi: 10.1016/j.jclinepi.2011.11.014.

‡W1 to W12:AHRQ (Agency for Healthcare Research and Quality), 1 = Yes, 0 = No / Unclear
W1. Define the source of information (survey, record review).
W2. List inclusion and exclusion criteria for exposed and unexposed subjects (cases and controls) or refer to previous publications.
W3. Indicate time period used for identifying patients.
W4. Indicate whether or not subjects were consecutive if not population-based.
W5. Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants.
W6. Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements).
W7. Explain any patient exclusions from analysis.
W8. Describe how confounding was assessed and/or controlled.
W9. If applicable, explain how missing data were handled in the analysis.
W10. Summarize patient response rates and completeness of data collection.
W11. Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained.
W12. Score
Reference: Rostom A, Dubé C, Cranney A, et al. Celiac disease. Rockville (MD): Agency for Healthcare Research and Quality (US); 2004.

Supplementary Table 5. Malnutrition screening or assessment tools

(1) Nutritional risk screening (NRS 2002)

Table (A) Initial screening			
1	Is BMI < 20.5?	Yes	No
2	Has the patient lost weight within the last 3 months?		
3	Has the patient had a reduced dietary intake in the last week?		
4	Is the patient severely ill ? (e.g. in intensive therapy)		

Yes: If the answer is 'Yes' to any question, the screening in Table 2 is performed.
No: If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation,
a preventive nutritional care plan is considered to avoid the associated risk status.

Table (B) Final screening				
Impaired nutritional status		Severity of disease (increase in requirements)		
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements	
Mild Score 1	Weight loss >5% in 3 months or Food intake below 50–75% of normal requirement in preceding week	Mild Score 1	Prototypes: A patient with chronic disease, admitted to hospital due to complications. The patient is weak but out of bed regularly. Protein requirement is increased, but can be covered by oral diet or supplements in most cases.	e.g., Hip fracture*, Chronic patients, in particular with acute complications: cirrhosis*, COPD*. Chronic hemodialysis, diabetes, oncology
Moderate Score 2	Weight loss >5% in 2 moths or BMI 18.5 – 20.5 + impaired general condition or Food intake 25–60% of normal requirement in preceding week	Moderate Score 2	Prototypes: A patient confined to bed due to illness. Protein requirement is substantially increased, but can be covered, although artificial feeding is required in many cases.	e.g., Major abdominal surgery*, Stroke* Severe pneumonia, hematologic malignancy
Severe Score 3	Weight loss >5% in 1 month (>15% in 3 months) or BMI <18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	Severe Score 3	Prototypes: A patient in intensive care with assisted ventilation etc. Protein requirement is increased and cannot be covered even by artificial feeding. Protein breakdown and nitrogen loss can be significantly attenuated.	e.g., Head injury*, Bone marrow transplantation*, Intensive care patients (APACHE>10)
Score: Age	+ if ≥70 years: add 1 to total score above	Score: =age-adjusted total score	=Total Score	

Score ≥3: the patient is nutritionally at-risk and a nutritional care plan is initiated
Score <3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.

NRS-2002 is based on an interpretation of available randomized clinical trials. An asterisk (*) indicates that a trial directly supports the categorization of patients with that diagnosis. Diagnoses shown in italics are based on the prototypes.
Nutritional risk is defined by the present nutritional status and risk of impairment of present status, due to increased requirements caused by stress metabolism of the clinical condition.
A nutritional care plan is indicated in all patients who are (1) severely undernourished (score=3), or (2) severely ill (score=3), or (3) moderately undernourished + mildly ill (score 2 +1), or (4) mildly undernourished + moderately ill (score 1 + 2).
Reference:
Kondrup J, Allison SP, Elia M, Vellas B, Plauth M. ESPEN guidelines for nutrition screening 2002. Clin Nutr. 2003;22:415–21. doi: 10.1016/s0261-5614(03)00098-0.

Supplementary Table 5. Malnutrition screening or assessment tools (cont.)

(2) Mini Nutritional Assessment Short-Form (MNA®-SF)

A	Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties? 0=severe loss of appetite 1=moderate loss of appetite 2=no loss of appetite
B	Weight loss during last months? 0=weight loss greater than 3 kg 1=does not know 2=weight loss between 1 and 3 kg 3=no weight loss
C	Mobility? 0=bed or chair bound 1=able to get out of bed / chair but does not go out 2=goes out
D	Has suffered physical stress or acute disease in the past 3 months? 0=yes 2=no
E	Neuropsychological problems? 0=severe dementia or depression 1=mild dementia 2=no psychological problems
F1	Body Mass Index (BMI) (weight in kg) / (height in m)^2? 0=BMI less than 19 1=BMI 19 to less than 21 2=BMI 21 to less than 23 3=BMI 23 or greater
IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2. DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.	
F2	Calf circumference (CC) in cm? 0 = CC less than 31 3 = CC 31 or greater

Screening score (total max. 14 points)	
12 points or greater:	Normal nutritional status
8 to 11 points:	At risk of malnutrition
7 points or below:	Malnutrition

Reference:
1. Vellas B, Villars H, Abellan G et al. Overview of the MNA--Its history and challenges. J Nutr Health Aging. 2006;10:456–63; discussion 63–5.
2. Rubenstein LZ, Harker JO, Salvà A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: developing the short-form mini-nutritional assessment (MNA-SF). J Gerontol A Biol Sci Med Sci. 2001;56:M366–72. doi: 10.1093/gerona/56.6.m366.
3. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature--What does it tell us? J Nutr Health Aging. 2006;10(6):466–85; discussion 85–7.
4. Kaiser MJ, Bauer JM, Ramsch C et al. Validation of the Mini Nutritional Assessment short-form (MNA-SF): a practical tool for identification of nutritional status. J Nutr Health Aging. 2009;13:782–8. doi: 10.1007/s12603-009-0214-7.

Supplementary Table 5. Malnutrition screening or assessment tools (cont.)

(3) Screening Tool for the Assessment of Malnutrition in Pediatrics (STAMP)

Step 1 – Diagnosis Use the following diagnosis, or locally developed criteria, to determine whether the child's condition has any nutritional implications. Assign a score according to whether he/she has definite (e.g. dysphagia), possible (e.g. behavioral eating problems), or no (e.g. day case surgery) nutritional implications, and progress to step 2.	
Does the child have a diagnosis that has any nutritional implications?	Score
Definite nutritional implications: Bowel failure, intractable diarrhea, Burns and major trauma, Crohn's disease, Cystic fibrosis, Dysphagia, Liver disease, Major surgery, Multiple food allergies/intolerances, Oncology on active treatment, Renal disease /failure, Inborn errors of metabolism	3
Possible nutritional implications: Behavioral eating problems, Cardiology, Cerebral palsy, Cleft lip and palate, Coeliac disease, Diabetes, Gastro-esophageal reflux, Minor surgery, Neuromuscular conditions, Psychiatric disorders, Respiratory syncytial virus (RSV), Single food allergy/intolerance	2
No nutritional implications: Day case surgery, Investigations	0
Step 2 - Nutritional Intake Use your knowledge of the child's eating habits to determine their nutritional intake. If necessary, speak to other Healthcare Professionals and the parent/carer to find out more. Assign a score according to the child's current nutritional intake, and progress to step 3.	
What is the child's nutritional intake?	Score
None	3
Recently decreased / poor	2
No change / good	0
Step 3 - Weight and Height Weigh and measure the child using the weighing and measuring instructions provided. Use the centile quick reference tables or a growth chart to determine how many columns/centiles apart the height and weight are. Then progress to Step 4.	
Use the centile quick reference tables to determine the child's measurements	Score
> 3 centile spaces/≥3 columns apart (or weight < 2nd centile)	3
> 2 centile spaces/= 2 columns apart	1
0 to 1 centile spaces/columns apart	0
Step 4 to 5 - Overall Risk of Malnutrition and Care Plan Add the scores from steps 1–3 together to calculate the child's overall risk of malnutrition.	
Add the scores from steps 1–3 together to calculate the overall risk of malnutrition	Score
High risk: Take action; Refer to a Dietitian, nutritional support team or consultant; Monitor as per care plan	≥ 4
Medium risk: Monitor nutritional intake for 3 days; Repeat STAMP screening after 3 days; Amend care plan as required	2-3
Low risk: Continue routine clinical care; Repeat STAMP screening weekly while child is an in-patient; Amend care plan as required	0-1

Reference:
1. Marino LV, Thomas PC, Beattie RM. Screening tools for paediatric malnutrition: are we there yet? Curr Opin Clin Nutr Metab Care. 2018;21:184–94. doi: 10.1097/mco.0000000000000464.
2. Hartman C, Shamir R, Hecht C, Koletzko B. Malnutrition screening tools for hospitalized children. Curr Opin Clin Nutr Metab Care. 2012;15:303–9. doi: 10.1097/MCO.0b013e328352dcd4.
3. BAPEN. Cases of child malnutrition in England double in last six months. 2020/7/1 [cited 2021/9/1]; Available from: https://www.bapen.org.uk/bapen-statements/child-malnutrition-in-england-doubles
4. McCarthy H, Dixon M, Crabtree I, Eaton-Evans MJ, McNulty H. The development and evaluation of the Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP©) for use by healthcare staff. J Hum Nutr Diet. 2012;25:311–8. doi: 10.1111/j.1365-277X.2012.01234.x.
5. Carey A, McCarthy H, Thompson A, McNulty H. A pilot study evaluating the use of the STAMP(©) nutrition screening tool in hospitalised infants. Clin Nutr ESPEN. 2015;10:e192. doi: 10.1016/j.clnesp.2015.03.036.

Supplementary Table 5. Malnutrition screening or assessment tools (cont.)

(4) Global Leadership Initiative on Malnutrition (GLIM)

Step1: Risk Screening	At risk of malnutrition Use validated screening tool: NRS-2002, MNA-SF, MUST, MST				
Step 2: Diagnostic Assessment	Apply GLIM assessment criteria				
	Phenotypic Criteria			Etiologic Criteria	
	Non-volitional weight loss (%)	Low body mass index (kg/m2)	Low muscle mass	Reduced food intake or assimilation	Disease or condition that is typically associated with inflammatory activity
	>5% within past 6 months, or > 10% beyond 6 months	<20 if< 70 years, or <22 if ≥ 70 years Asia: < 18.5 if < 70 years, or <20 if ≥ 70 years	Examples of recommended thresholds for low muscle mass or its surrogate markers (see tables below)	≤ 50% of energy requirements > 1 week, or any reduaion for >2 weeks, or any chronic gastrointestinal condition that adversely impacts food assimilation or absorption	Guidance statements for assessment of the GLIM etiologic criterion of inflammation (see tables below)
Step 3: Diagnosis	Meets criteria for malnutrition diagnosis Requires at least 1 Phenotypic criterion and 1 Etiologic criterion				
Step 4: Severity Grading	Determine severity of malnutrition Severity determined based on Phenotypic criterion				
		Phenotypic Criteria			
		Weight loss (%)	Low body mass index (kg/m^2)	Reduced muscle mass	
	Stage 1 Moderate Malnutrition (Requires 1 phenotypic criterion that meets this grade)	5-10% within the past 6 months, or 10-20% beyond 6 months	<20 if < 70 years old <22 if ≥ 70 years old	Data for severity grading are not available	
	Stage 2 Severe Malnutrition (Requires 1 phenotypic criterion that meets this grade)	> 10% within the past 6 mo. or >20% beyond 6 mo.	<18.5 if < 70 years old <20 if ≥ 70 years old	Data for severity grading are not available	

Examples of recommended thresholds for low muscle mass or its surrogate markers

Adjustments should be made by height^2, weight or BMI (for use in persons with obesity). The recommendations are feasible for adults.	Males	Females
Appendicular lean Mass index (ALMI), kg/m^2 (DXA)	<7	<5.5
Appendicular skeletal muscle Mass index (ASMI) or (ALMI) kg/m^2		
Bioelectrical impedance analysis (BIA)	<7	<5.7
Dual energy X-ray absorptiometry (DXA)	<7	<5.4
Fat-free Mass index (FFMI), kg/m^2 (BIA)	<17	<15
Appendicular lean Mass (ALM)/weight (%) (DXA)	<25.7	<19.4
ALM/Body Mass index (BMI), m^2 (DXA)	<0.827	<0.518
Calf circumference, cm	<33	<32

Guidance statements for assessment of the GLIM etiologic criterion of inflammation

Statement 1: Fulfilment of the GLIM inflammation criterion	The occurrence of acute or chronic disease, infection, or injury that is often/usually associated with inflammatory activity may fulfill the GLIM disease burden/inflammation criterion; i.e., confirmation by laboratory markers is not always necessary. When testing is available, we recommend that laboratory markers be measured in uncertain cases to help confirm the inflammatory character of the underlying disease or condition.
Statement 2: Conditions with severe/moderate acute inflammation	Confirmation of the presence of severe or moderate acute inflammation should be guided by clinical judgement based upon underlying diagnosis or condition, clinical signs, or laboratory markers. Examples of acute diseases or conditions that may be associated with acute inflammation of severe/moderate degree include critical illness or sepsis, and exacerbations of COPD or Crohn's disease.
Statement 3: Conditions with mild to moderate chronic inflammation	Confirmation of the presence of mild to moderate chronic inflammation should be guided by clinical judgement based upon underlying diagnosis or condition, clinical signs, or laboratory markers. Examples of diseases that may be associated with chronic inflammation of mild/moderate degree include congestive heart failure, cancer, and chronic kidney disease.
Statement 4: Conditions with no clear or perceptible inflammation	Disease conditions that have no clear or perceptible inflammatory components will not fulfill the disease burden/inflammation criterion unless confirmed by laboratory analyses. Examples include anorexia nervosa, depression, and dysphagia, and non-disease conditions that are associated with limited resources or environment that compromise food security, access, or intake, including poverty, famine, and war.
Statement 5: Laboratory markers indicating inflammation	The documentation of laboratory markers indicating inflammation may support confirmation of the inflammation criterion. Use of CRP is recommended in cases of clinical uncertainty.
Statement 6: Application of CRP testing	For acute conditions, CRP levels ≥10 times higher than the upper reference value for the methodology of the selected clinical laboratory can be used to support the presence of moderate to severe acute inflammation. For chronic conditions, serial measures of CRP higher than the upper reference value for the methodology of the selected clinical laboratory support the presence of the chronic inflammation criterion.
Statement 7: Application of clinical judgement	Clinical judgement based upon integration of underlying diagnosis or condition, clinical signs, and/or laboratory markers should guide confirmation of the presence of inflammatory disease or condition. The sound interpretation of some of these indicators requires clinical training and expertise.

COPD = Chronic Obstructive Pulmonary Disease, CRP = C-reactive Protein.

Reference:
1. Barazzoni R, Jensen GL, Correia M et al. Guidance for assessment of the muscle mass phenotypic criterion for the Global Leadership Initiative on Malnutrition (GLIM) diagnosis of malnutrition. Clin Nutr. 2022;41:1425–33. doi: 10.1016/j.clnu.2022.02.001.
2. Jensen GL, Cederholm T, Correia M et al. GLIM Criteria for the Diagnosis of Malnutrition: A Consensus Report From the Global Clinical Nutrition Community. JPEN J Parenter Enteral Nutr. 2019;43:32–40. doi: 10.1002/jpen.1440.
3. Cederholm T, Jensen GL, Correia M et al. The GLIM consensus approach to diagnosis of malnutrition: A 5-year update. Clin Nutr. 2025;49:11–20. doi: 10.1016/j.clnu.2025.03.018.

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
1	Barros, T. A.[12]	2022	Brazil	5.6	372	300	STAMP≥2	≥2y	NR
2	Elif Öztürk, M.[42]	2023	Turkey	7.86	78	52	STAMP≥2	≥2y	DP
3	Kaya, D. G.[65]	2023	Turkey	4	330	274	STAMP≥2	≥2y	Others
4	Omar O.M.[109]	2024	Egypt	3.97	164	136	STAMP≥2	≥2y	Others
5	Ong, S. H.[111]	2019	Malaysia	3.05	52	30	STAMP≥2	≥2y	Others
6	Zheng, J.[173]	2023	China	NR	NR	NR	STAMP≥2	≥2y	NR
7	Ahmadi, S.[3]	2022	Iran	55.4	61	39	NRS2002≥3	≥18y	NR
8	Alikiaii, B. [5]	2021	Iran	58.9	46	27	NRS2002≥3	≥18y	DP
9	Alvarez-Altamirano, K[6]	2024	Mexico	49.7	NR	NR	NRS2002≥3	≥18y	DP
10	Aynaci, G.[8]	2019	Turkey	55.3	NR	NR	NRS2002≥3	≥18y	NR
11	Balci, C.[10]	2021	Turkey	62.2	100	131	NRS2002≥3	≥18y	Others
12	Bannert, K.[11]	2023	Germany	55.5	112	75	NRS2002≥3	≥18y	NR
13	Boulhosa, R. S. S. B.[15]	2020	Brazil	56.8	NR	NR	NRS2002≥3	≥18y	DP
14	Burgos, R.[16]	2020	Spain	76.9	57	44	NRS2002≥3	≥18y	DP
15	Cano Megías, M.[19]	2023	Spain	71.3	236	197	NRS2002≥3	≥18y	NR
16	Cao, J. J.[20]	2021	China	62.7	1209	273	NRS2002≥3	≥18y	Others
17	Cao, Q.[21]	2019	China	42.2	48	30	NRS2002≥3	≥18y	NR
18	Celik, Z. M.[24]	2021	Turkey	NR	83	79	NRS2002≥3	≥18y	Others
19	Chávez-Tostado, M.[26]	2020	Mexico	36.4	NR	NR	NRS2002≥3	≥18y	DP

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
1	Barros, T. A.[12]	Americas	Upper middle	STAMP≥2	435	672
2	Elif Öztürk, M.[42]	European	Upper middle	STAMP≥2	69	125
3	Kaya, D. G.[65]	European	Upper middle	24h	164	604
4	Omar O.M.[109]	Eastern Mediterranean	Lower middle	NR	137	188
5	Ong, S. H.[111]	Western Pacific	Upper middle	NR	65	82
6	Zheng, J.[173]	Western Pacific	Upper middle	24h	9154	18920
7	Ahmadi, S.[3]	Eastern Mediterranean	Upper middle	24h	70	100
8	Alikiaii, B. [5]	Eastern Mediterranean	Upper middle	NR	73	73
9	Alvarez-Altamirano, K[6]	Americas	Upper middle	72h	428	913
10	Aynaci, G.[8]	European	Upper middle	48h	118	403
11	Balci, C.[10]	European	Upper middle	48h	88	231
12	Bannert, K.[11]	European	High	NR	63	187
13	Boulhosa, R. S. S. B.[15]	Americas	Upper middle	NR	58	166
14	Burgos, R.[16]	European	High	48h	84	101
15	Cano Megías, M.[19]	European	High	NR	84	433
16	Cao, J. J.[20]	Western Pacific	Upper middle	48h	731	1476
17	Cao, Q.[21]	Western Pacific	Upper middle	24h	46	78
18	Celik, Z. M.[24]	European	Upper middle	NR	40	162
19	Chávez-Tostado, M.[26]	Americas	Upper middle	24h	131	196

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
20	Chen, J. [27]	2022	China	61	NR	NR	NRS2002≥3	≥18y	Others
21	Chen, W.[29]	2023	China	47.5	9858	5083	NRS2002≥3	≥18y	DP
22	Çoban, E.[32]	2019	Turkey	66.2	173	145	NRS2002≥3	≥18y	NR
23	Dahl, H.[34]	2022	Norway	62	39	14	NRS2002≥3	≥18y	Others
24	Dai, L. L.[35]	2022	China	60.7	433	250	NRS2002≥3	≥18y	Others [45]
25	Deng, L. H.[37]	2023	China	55.3	65	43	NRS2002≥3	≥18y	NR
26	Doganay, M.[39]	2025	Turkey	60	104219	86809	NRS2002≥3	≥18y	DP
27	Dou, L.[40]	2020	China	64.7	51	150	NRS2002≥3	≥18y	DP
28	Fernandes, A. C.[43]	2020	Portugal	76.2	73	56	NRS2002≥3	≥18y	NR
29	Gao, B.[45]	2022	China	62.2	285	147	NRS2002≥3	≥18y	DP
30	Geng, H.[47]	2021	China	28.9	NR	NR	NRS2002≥3	≥18y	Others
31	Gregoriano, C.[50]	2022	Switzerland	66	203	102	NRS2002≥3	≥18y	NR
32	Guan C.[51]	2024	China	NR	252	92	NRS2002≥3	≥18y	NR
33	Guo, F.[52]	2023	China	39.1	54	44	NRS2002≥3	≥18y	DP
34	Gutiérrez-de-Santiago, J. L.[53]	2019	Mexico	60.3	101	146	NRS2002≥3	≥18y	NR
35	Hamdan, M. H.[54]	2022	Palestine	53.9	44	88	NRS2002≥3	≥18y	Others
36	Hashemi, S. T.[55]	2021	Iran	NR	65	35	NRS2002≥3	≥18y	DP
37	Huang, D. D.[56]	2022	China	66	1000	359	NRS2002≥3	≥18y	NR
38	Huang, S. S.[57]	2022	China	36	52	21	NRS2002≥3	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
20	Chen, J. [27]	Western Pacific	Upper middle	NR	36	85
21	Chen, W.[29]	Western Pacific	Upper middle	NR	8346	14941
22	Çoban, E.[32]	European	Upper middle	120h	11	82
23	Dahl, H.[34]	European	High	Preoperative	14	53
24	Dai, L. L.[35]	Western Pacific	Upper middle	NR	172	683
25	Deng, L. H.[37]	Western Pacific	Upper middle	NR	55	108
26	Doganay, M.[39]	European	Upper middle	NR	22165	191028
27	Dou, L.[40]	Western Pacific	Upper middle	NR	69	201
28	Fernandes, A. C.[43]	European	High	48h	92	129
29	Gao, B.[45]	Western Pacific	Upper middle	24h	170	432
30	Geng, H.[47]	Western Pacific	Upper middle	24h	23	129
31	Gregoriano, C.[50]	European	High	24h	76	305
32	Guan C.[51]	Western Pacific	Upper middle	NR	63	338
33	Guo, F.[52]	Western Pacific	Upper middle	NR	98	98
34	Gutiérrez-de-Santiago, J. L.[53]	Americas	Upper middle	Preoperative	103	247
35	Hamdan, M. H.[54]	Eastern Mediterranean	Lower middle	NR	31	132
36	Hashemi, S. T.[55]	Eastern Mediterranean	Upper middle	24h	45	98
37	Huang, D. D.[56]	Western Pacific	Upper middle	NR	492	1359
38	Huang, S. S.[57]	Western Pacific	Upper middle	NR	48	73

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
39	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	NRS2002≥3	≥18y	Others
40	Jiang, M.[59]	2022	China	69.2	123	86	NRS2002≥3	≥18y	Others
41	Kang, L. H.[61]	2023	China	NR	11278	10179	NRS2002≥3	≥18y	Others
42	Kasapoglu, U. S.[62]	2022	Turkey	64.3	NR	NR	NRS2002≥3	≥18y	NR
43	Kaya, A. S. [64]	2022	Turkey	59.4	70	96	NRS2002≥3	≥18y	NR
44	Kaya, A. S.[63]	2020	Turkey	NR	64	46	NRS2002≥3	≥18y	Others
45	Kong, X.[68]	2025	China	69	117	43	NRS2002≥3	≥18y	NR
46	Koroušić Seljak, B.[69]	2020	Slovenia	NR	99	108	NRS2002≥3	≥18y	NR
47	Lang, J. L.[72]	2022	China	58.1	197	192	NRS2002≥3	≥18y	DP
48	Leandro-Merhi, V. A.[73]	2021	Brazil	57.9	394	227	NRS2002≥3	≥18y	DP
49	Lehmann, U.[76]	2025	Switzerland	73	289	269	NRS2002≥3	≥18y	DP
50	Liu, A. H.[78]	2021	China	60	380	380	NRS2002≥3	≥18y	NR
51	Liu, C. Y.[79]	2021	China	NR	1523	865	NRS2002≥3	≥18y	NR
52	Liu, J. F.[81]	2025	China	NR	190	110	NRS2002≥3	≥18y	NR
53	Liu, Y.[83]	2021	China	63.2	64	54	NRS2002≥3	≥18y	NR
54	Ma, J.[86]	2020	China	61.8	181	16	NRS2002≥3	≥18y	DP
55	Ma, Wei[87]	2024	China	57	252	NR	NRS2002≥3	≥18y	Others
56	Marinho, R.[90]	2021	Portugal	NR	369	360	NRS2002≥3	≥18y	Others
57	Martins, P. M.[92]	2022	Brazil	NR	NR	NR	NRS2002≥3	≥18y	DP

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
39	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	145	290
40	Jiang, M.[59]	Western Pacific	Upper middle	NR	195	209
41	Kang, L. H.[61]	Western Pacific	Upper middle	72h	6158	21457
42	Kasapoglu, U. S.[62]	European	Upper middle	Preoperative	229	281
43	Kaya, A. S. [64]	European	Upper middle	NR	27	166
44	Kaya, A. S.[63]	European	Upper middle	NR	97	110
45	Kong, X.[68]	Western Pacific	Upper middle	24h	76	160
46	Koroušić Seljak, B.[69]	European	High	NR	67	101
47	Lang, J. L.[72]	Western Pacific	Upper middle	Perioperative	141	389
48	Leandro-Merhi, V. A.[73]	Americas	Upper middle	24h	246	621
49	Lehmann, U.[76]	European	High	72h	333	558
50	Liu, A. H.[78]	Western Pacific	Upper middle	48h	628	760
51	Liu, C. Y.[79]	Western Pacific	Upper middle	NR	1212	2388
52	Liu, J. F.[81]	Western Pacific	Upper middle	NR	105	300
53	Liu, Y.[83]	Western Pacific	Upper middle	24h	31	118
54	Ma, J.[86]	Western Pacific	Upper middle	24h	29	197
55	Ma, Wei[87]	Western Pacific	Upper middle	24h	205	440
56	Marinho, R.[90]	European	High	72h	371	729
57	Martins, P. M.[92]	Americas	Upper middle	NR	63	72

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
58	Meissner, C.[94]	2023	Germany, Austria, Switzerland	68.5	1822	1273	NRS2002≥3	≥18y	NR
59	Miao, J. P.[96]	2019	China	81.2	293	132	NRS2002≥3	≥18y	Others
60	Mishamandani, Z. J.[97]	2019	Iran	NR	771	540	NRS2002≥3	≥18y	NR
61	Munk, T.[100]	2025	Denmark	75	60	64	NRS2002≥3	≥18y	NR
62	Nguyen, L. H. T.[103]	2023	Vietnam	68	74	89	NRS2002≥3	≥18y	NR
63	Nucci, D.[107]	2023	Italy	56.7	57	33	NRS2002≥3	≥18y	DP
64	Orell, H.[112]	2023	Finland	67	1561	1492	NRS2002≥3	≥18y	DP
65	Ottestad I.[114]	2024	Norway	65	207	235	NRS2002≥3	≥18y	NR
66	Ouaijan, K.[115]	2023	Lebanon	60	188	155	NRS2002≥3	≥18y	NR
67	Ozsenel, E. B.[117]	2025	Turkey	NR	89	89	NRS2002≥3	≥18y	DP
68	Pimentel, R. F. W.[119]	2021	Brazil	45.7	NR	NR	NRS2002≥3	≥18y	NR
69	Pironi, L.[120]	2021	Italy	74	147	121	NRS2002≥3	≥18y	Others
70	Quncuo, C.[124]	2022	China	55.7	166	123	NRS2002≥3	≥18y	DP
71	Reiner, J.[126]	2022	Germany	43.7	56	45	NRS2002≥3	≥18y	NR
72	Rinninella, E.[128]	2018	Italy	63.7	172	128	NRS2002≥3	≥18y	NR
73	Rivelsrud, M.[129]	2021	Norway	63.1	146	137	NRS2002≥3	≥18y	NR
74	Santos, I. M.[133]	2021	Portugal	67.4	155	110	NRS2002≥3	≥18y	NR
75	Santos, M. L. D. D.[134]	2022	Brazil	60	142	189	NRS2002≥3	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
58	Meissner, C.[94]	European, Western Pacific	High	Preoperative	1122	2968
59	Miao, J. P.[96]	Western Pacific	Upper middle	NR	174	425
60	Mishamandani, Z. J.[97]	Eastern Mediterranean	Upper middle	48h	514	1253
61	Munk, T.[100]	European	High	24h	81	124
62	Nguyen, L. H. T.[103]	Western Pacific	Lower middle	24h	102	163
63	Nucci, D.[107]	European	High	24h	31	90
64	Orell, H.[112]	European	High	48h	921	3053
65	Ottestad I.[114]	European	High	24h	123	435
66	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	107	343
67	Ozsenel, E. B.[117]	European	Upper middle	24h	48	178
68	Pimentel, R. F. W.[119]	Americas	Upper middle	NR	32	41
69	Pironi, L.[120]	European	High	24h	207	268
70	Quncuo, C.[124]	Western Pacific	Upper middle	24h	133	289
71	Reiner, J.[126]	European	High	24h	24	202
72	Rinninella, E.[128]	European	High	24h	157	300
73	Rivelsrud, M.[129]	European	High	24h	174	283
74	Santos, I. M.[133]	European	High	NR	98	114
75	Santos, M. L. D. D.[134]	Americas	Upper middle	72h	166	331

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
76	Shabanpur, M.[136]	2022	Iran	55	235	165	NRS2002≥3	≥18y	DP
77	Skeie, E.[140]	2021	Norway	65	9866	9067	NRS2002≥3	≥18y	DP
78	Song, D.[142]	2022	China	58.2	518	355	NRS2002≥3	≥18y	NR
79	Song, M. M.[143]	2022	China	56.8	4338	4140	NRS2002≥3	≥18y	NR
80	Sun, W. J.[144]	2022	China	57	210	75	NRS2002≥3	≥18y	NR
81	Susetyowati,[145]	2019	Indonesia	45	107	104	NRS2002≥3	≥18y	NR
82	Tan S.[146]	2024	China	56.6	170	37	NRS2002≥3	≥18y	DP
83	Trollebø, M. A.[151]	2022	Norway	71	174	154	NRS2002≥3	≥18y	NR
84	Tu Y.[152]	2024	China	60	166	43	NRS2002≥3	≥18y	Others
85	Wang R[154]	2024	China	58.2	166	41	NRS2002≥3	≥18y	Others
86	Wei, W.[158]	2023	China	41.3	NR	263	NRS2002≥3	≥18y	NR
87	Xie, B. X.[159]	2022	China	62.8	178	123	NRS2002≥3	≥18y	Others
88	Yu, Y.[167]	2021	China	NR	72	67	NRS2002≥3	≥18y	NR
89	Zezelj, S. P.[169]	2020	Croatia	68.8	76	84	NRS2002≥3	≥18y	NR
90	Zhang, Y.[171]	2022	China	38.5	163	55	NRS2002≥3	≥18y	DP
91	Zhang, Z.[172]	2021	China	56.8	383	254	NRS2002≥3	≥18y	Others
92	Zheng, J.[173]	2023	China	NR	NR	NR	NRS2002≥3	≥18y	NR
93	Zhou, L. M.[175]	2023	China	59.7	335	171	NRS2002≥3	≥18y	DP
94	Zhou, L. P.[176]	2021	China	64.8	1485	724	NRS2002≥3	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
76	Shabanpur, M.[136]	Eastern Mediterranean	Upper middle	24h	387	400
77	Skeie, E.[140]	European	High	NR	5121	18933
78	Song, D.[142]	Western Pacific	Upper middle	NR	147	826
79	Song, M. M.[143]	Western Pacific	Upper middle	NR	2217	8478
80	Sun, W. J.[144]	Western Pacific	Upper middle	NR	210	285
81	Susetyowati,[145]	South-East Asia	Upper middle	NR	155	211
82	Tan S.[146]	Western Pacific	Upper middle	24h	63	207
83	Trollebø, M. A.[151]	European	High	48h	143	328
84	Tu Y.[152]	Western Pacific	Upper middle	24h	18	209
85	Wang R[154]	Western Pacific	Upper middle	48h	49	207
86	Wei, W.[158]	Western Pacific	Upper middle	NR	455	605
87	Xie, B. X.[159]	Western Pacific	Upper middle	48h	125	301
88	Yu, Y.[167]	Western Pacific	Upper middle	NR	75	139
89	Zezelj, S. P.[169]	European	High	48h	64	160
90	Zhang, Y.[171]	Western Pacific	Upper middle	NR	164	238
91	Zhang, Z.[172]	Western Pacific	Upper middle	NR	158	637
92	Zheng, J.[173]	Western Pacific	Upper middle	NR	56435	303410
93	Zhou, L. M.[175]	Western Pacific	Upper middle	NR	170	506
94	Zhou, L. P.[176]	Western Pacific	Upper middle	NR	768	2209

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
95	Zhou, LM[177]	2024	China	68.3	262	202	NRS2002≥3	≥18y	DP
96	Zhou, X.[178]	2020	China	56.3	431	379	NRS2002≥3	≥18y	Others
97	Deng, L. M.[38]	2025	China	NR	1863	1326	NRS2002≥3	≥18y	DP
98	Can, B.[18]	2022	Turkey	75.1	59	65	NRS2002≥3	≥60y	Others
99	Li, Y.[77]	2023	China	77.4	68	148	NRS2002≥3	≥60y	Others
100	Liu, H.[80]	2021	China	NR	3096	2290	NRS2002≥3	≥60y	Others
101	Wang, L.[156]	2023	China	70	82	105	NRS2002≥3	≥60y	NR
102	Yang J.-Y.[163]	2024	China	69.1	77	44	NRS2002≥3	≥60y	NR
103	Zhang, Q.[170]	2022	China	70	193	72	NRS2002≥3	≥60y	Others
104	Acehan, S.[1]	2020	Turkey	NR	124	127	NRS2002≥3	≥65y	DP
105	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	NRS2002≥3	≥65y	DP
106	Caliskan, E.[17]	2019	Turkey	79.4	12	44	NRS2002≥3	≥65y	Others
107	Chávez-Tostado, M.[26]	2020	Mexico	36.4	NR	NR	NRS2002≥3	≥65y	DP
108	Chen, L. R.[28]	2022	China	74.7	1634	1100	NRS2002≥3	≥65y	NR
109	Chen, XQ[30]	2023	China	NR	1155	1490	NRS2002≥3	≥65y	NR
110	Doganay, M.[39]	2025	Turkey	60	104219	86809	NRS2002≥3	≥65y	DP
111	Dou, L.[40]	2020	China	64.7	51	150	NRS2002≥3	≥65y	DP
112	Kaya, A. S.[64]	2022	Turkey	59.4	70	96	NRS2002≥3	≥65y	NR
113	Leandro-Merhi, V. A.[74]	2023	Brazil	74.2	314	186	NRS2002≥3	≥65y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
95	Zhou, LM[177]	Western Pacific	Upper middle	24h	246	464
96	Zhou, X.[178]	Western Pacific	Upper middle	48h	345	810
97	Deng, L. M.[38]	Western Pacific	Upper middle income	48h	1160	3189
98	Can, B.[18]	European	Upper middle	24h	83	121
99	Li, Y.[77]	Western Pacific	Upper middle	NR	103	216
100	Liu, H.[80]	Western Pacific	Upper middle	24h	3517	5386
101	Wang, L.[156]	Western Pacific	Upper middle	48h	98	140
102	Yang J.-Y.[163]	Western Pacific	Upper middle	48h	63	121
103	Zhang, Q.[170]	Western Pacific	Upper middle	NR	182	265
104	Acehan, S.[1]	European	Upper middle	48h	228	251
105	Bech, C. B.[13]	European	High	96h	80	105
106	Caliskan, E.[17]	European	Upper middle	24h	34	56
107	Chávez-Tostado, M.[26]	Americas	Upper middle	24h	24	24
108	Chen, L. R.[28]	Western Pacific	Upper middle	48h	1411	2734
109	Chen, XQ[30]	Western Pacific	Upper middle	48h	240	2645
110	Doganay, M.[39]	European	Upper middle	NR	15267	74804
111	Dou, L.[40]	Western Pacific	Upper middle	NR	43	102
112	Kaya, A. S.[64]	European	Upper middle	NR	23	67
113	Leandro-Merhi, V. A.[74]	Americas	Upper middle	NR	244	500

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
114	Liu, A. H.[78]	2021	China	60	380	380	NRS2002≥3	≥65y	NR
115	Oner O.[110]	2024	Turkey	76.9	48	48	NRS2002≥3	≥65y	NR
116	Polat, O.[121]	2022	Turkey	74.8	220	231	NRS2002≥3	≥65y	NR
117	Thomsen, T. K.[149]	2023	Denmark	77.6	123	114	NRS2002≥3	≥65y	Others
118	Xu, J. Y.[161]	2020	China	78	NR	NR	NRS2002≥3	≥65y	NR
119	Yuksel, B.[168]	2022	Turkey	69.6	109	NR	NRS2002≥3	≥65y	NR
120	Chávez-Tostado, M.[26]	2020	Mexico	36.4	NR	NR	NRS2002≥3	<65y	DP
121	Chen, X.[30]	2024	China	NR	1155	1490	NRS2002≥3	<65y	NR
122	Dou, L.[40]	2020	China	64.7	51	150	NRS2002≥3	<65y	DP
123	Kaya, A. S.[64]	2022	Turkey	59.4	70	96	NRS2002≥3	<65y	NR
124	Liu, A. H.[78]	2021	China	60	380	380	NRS2002≥3	<65y	NR
125	Celik, Z. M.[24]	2021	Turkey	NR	83	79	NRS2002≥3	female	Others
126	Chen, XQ[30]	2023	China	NR	1155	1490	NRS2002≥3	female	NR
127	Dahl, H.[34]	2022	Norway	62	39	14	NRS2002≥3	female	Others
128	Doganay, M.[39]	2025	Turkey	60	104219	86809	NRS2002≥3	female	DP
129	Dou, L.[40]	2020	China	64.7	51	150	NRS2002≥3	female	DP
130	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	NRS2002≥3	female	Others
131	Kaya, A. S.[63]	2020	Turkey	NR	64	46	NRS2002≥3	female	Others
132	Lai, X. X.[71]	2020	China	85.9	269	89	NRS2002≥3	female	Others

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
114	Liu, A. H.[78]	Western Pacific	Upper middle	48h	305	317
115	Oner O.[110]	European	Upper middle	24h	95	96
116	Polat, O.[121]	European	Upper middle	48h	292	451
117	Thomsen, T. K.[149]	European	High	NR	177	294
118	Xu, J. Y.[161]	Western Pacific	Upper middle	Preoperative	3393	6519
119	Yuksel, B.[168]	European	Upper middle	NR	70	200
120	Chávez-Tostado, M.[26]	Americas	Upper middle income	24h	123	196
121	Chen, X.[30]	Western Pacific	Upper middle income	48h	172	2120
122	Dou, L.[40]	Western Pacific	Upper middle income	NR	26	99
123	Kaya, A. S.[64]	European	Upper middle income	NR	4	99
124	Liu, A. H.[78]	Western Pacific	Upper middle income	48h	323	443
125	Celik, Z. M.[24]	European	Upper middle	NR	13	79
126	Chen, XQ[30]	Western Pacific	Upper middle	48h	117	1490
127	Dahl, H.[34]	European	High	Preoperative	4	14
128	Doganay, M.[39]	European	Upper middle	NR	9763	86809
129	Dou, L.[40]	Western Pacific	Upper middle	NR	15	51
130	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	53	113
131	Kaya, A. S.[63]	European	Upper middle	NR	41	46
132	Lai, X. X.[71]	Western Pacific	Upper middle	NR	46	180

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
133	Liu, A. H.[78]	2021	China	60	380	380	NRS2002≥3	female	NR
134	Ozsenel, E. B.[117]	2025	Turkey	NR	89	89	NRS2002≥3	female	DP
135	Shabanpur, M.[136]	2022	Iran	55	235	165	NRS2002≥3	female	DP
136	Silva RJG[138]	2023	Brazil	59.2	0	100	NRS2002≥3	female	NR
137	Celik, Z. M.[24]	2021	Turkey	NR	83	79	NRS2002≥3	male	Others
138	Chen, XQ[30]	2023	China	NR	1155	1490	NRS2002≥3	male	NR
139	Dahl, H.[34]	2022	Norway	62	39	14	NRS2002≥3	male	Others
140	Doganay, M.[39]	2025	Turkey	60	104219	86809	NRS2002≥3	male	DP
141	Dou, L.[40]	2020	China	64.7	51	150	NRS2002≥3	male	DP
142	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	NRS2002≥3	male	Others
143	Kaya, A. S.[63]	2020	Turkey	NR	64	46	NRS2002≥3	male	Others
144	Lai, X. X.[71]	2020	China	85.9	269	89	NRS2002≥3	male	Others
145	Liu, A. H.[78]	2021	China	60	380	380	NRS2002≥3	male	NR
146	Ozsenel, E. B.[117]	2025	Turkey	NR	89	89	NRS2002≥3	male	DP
147	Shabanpur, M.[136]	2022	Iran	55	235	165	NRS2002≥3	male	DP
148	Adly, N. N.[2]	2020	Egypt	68.7	NR	NR	MNA-SF≤7	≥60y	NR
149	Alvarez-Larruy, M. [7]	2023	Spain	71.8	28	17	MNA-SF≤7	≥60y	NR
150	Borges, K.[14]	2022	Spain	84.3	10	80	MNA-SF≤7	≥60y	NR
151	Carretero Gómez, J. [22]	2023	Spain	76	306	313	MNA-SF≤7	≥60y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
133	Liu, A. H.[78]	Western Pacific	Upper middle	48h	319	380
134	Ozsenel, E. B.[117]	European	Upper middle	24h	22	89
135	Shabanpur, M.[136]	Eastern Mediterranean	Upper middle	24h	160	165
136	Silva RJG[138]	Americas	Upper middle	NR	25	100
137	Celik, Z. M.[24]	European	Upper middle	NR	27	83
138	Chen, XQ[30]	Western Pacific	Upper middle	48h	123	1155
139	Dahl, H.[34]	European	High	Preoperative	10	39
140	Doganay, M.[39]	European	Upper middle	NR	12402	104219
141	Dou, L.[40]	Western Pacific	Upper middle	NR	54	150
142	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	92	177
143	Kaya, A. S.[63]	European	Upper middle	NR	56	64
144	Lai, X. X.[71]	Western Pacific	Upper middle	NR	134	180
145	Liu, A. H.[78]	Western Pacific	Upper middle	48h	309	380
146	Ozsenel, E. B.[117]	European	Upper middle	24h	26	89
147	Shabanpur, M.[136]	Eastern Mediterranean	Upper middle	24h	227	235
148	Adly, N. N.[2]	Eastern Mediterranean	Lower middle	48h	35	190
149	Alvarez-Larruy, M. [7]	European	High	NR	4	45
150	Borges, K.[14]	European	High	NR	19	90
151	Carretero Gómez, J. [22]	European	High	NR	228	619

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
152	Carvalho, J. [23]	2022	Brazil	NR	NR	NR	MNA-SF≤7	≥60y	NR
153	Efendioglu, E. M.[41]	2022	Turkey	74.9	50	86	MNA-SF≤7	≥60y	NR
154	Fukui, S.[44]	2020	Japan	83.8	91	209	MNA-SF≤7	≥60y	NR
155	Kobayashi, H.[67]	2022	Japan	84	37	120	MNA-SF≤7	≥60y	NR
156	Koroušić Seljak, B.[69]	2020	Slovenia	NR	99	108	MNA-SF≤7	≥60y	NR
157	Lueg, G.[85]	2020	Germany	82.2	76	121	MNA-SF≤7	≥60y	NR
158	Makwana, N. R.[89]	2019	India	NR	85	78	MNA-SF≤7	≥60y	NR
159	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	MNA-SF≤7	≥60y	NR
160	Mercan Baspinar M.[95]	2024	Turkey	76.6	46	29	MNA-SF≤7	≥60y	NR
161	Kumar, S.[70]	2025	India	69.1	53	47	MNA-SF≤7	≥60y	NR
162	Naaman, R. K.[102]	2023	Saudi Arabia	73	47	53	MNA-SF≤7	≥60y	NR
163	Thiam, C. N.[147]	2022	Malaysia	74.4	NR	NR	MNA-SF≤7	≥60y	NR
164	Tran, T. P.[150]	2021	Vietnam	75.5	NR	587	MNA-SF≤7	≥60y	NR
165	Yuksel, B.[168]	2022	Turkey	69.6	109	NR	MNA-SF≤7	≥60y	NR
166	Zheng, J.[173]	2023	China	NR	NR	NR	MNA-SF≤7	≥60y	NR
167	Adly, N. N.[2]	2020	Egypt	68.7	NR	NR	MNA-SF≤11	≥60y	NR
168	Alvarez-Larruy, M.[7]	2023	Spain	71.8	28	17	MNA-SF≤11	≥60y	NR
169	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	MNA-SF≤11	≥60y	NR
170	Borges, K.[14]	2022	Spain	84.3	10	80	MNA-SF≤11	≥60y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
152	Carvalho, J. [23]	Americas	Upper middle	NR	3	138
153	Efendioglu, E. M.[41]	European	Upper middle	NR	54	136
154	Fukui, S.[44]	Western Pacific	High	NR	34	300
155	Kobayashi, H.[67]	Western Pacific	High	24h	42	157
156	Koroušić Seljak, B.[69]	European	High	NR	42	106
157	Lueg, G.[85]	European	High	24h	69	197
158	Makwana, N. R.[89]	South-East Asia	Lower middle	48h	17	163
159	Matsumoto, Y.[93]	Western Pacific	High	24h	88	487
160	Mercan Baspinar M.[95]	European	Upper middle	24h	37	75
161	Kumar, S.[70]	South-East Asia	Lower middle	NR	17	100
162	Naaman, R. K.[102]	Eastern Mediterranean	High	48h	48	100
163	Thiam, C. N.[147]	Western Pacific	Upper middle	24h	28	73
164	Tran, T. P.[150]	Western Pacific	Lower middle	NR	174	1007
165	Yuksel, B.[168]	European	Upper middle	NR	13	200
166	Zheng, J.[173]	Western Pacific	Upper middle	24h	1923	2810
167	Adly, N. N.[2]	Eastern Mediterranean	Lower middle	48h	106	190
168	Alvarez-Larruy, M.[7]	European	High	NR	19	45
169	Bech, C. B.[13]	European	High	96h	72	105
170	Borges, K.[14]	European	High	NR	64	90

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
171	Carretero Gómez, J.[22]	2023	Spain	76	306	313	MNA-SF≤11	≥60y	NR
172	Carvalho, J.[23]	2022	Brazil	NR	NR	NR	MNA-SF≤11	≥60y	NR
173	Efendioglu, E. M.[41]	2022	Turkey	74.9	50	86	MNA-SF≤11	≥60y	Others
174	Fukui, S.[44]	2020	Japan	83.8	91	209	MNA-SF≤11	≥60y	NR
175	Genest, F.[46]	2021	Germany	75	0	107	MNA-SF≤11	≥60y	NR
176	Kaluzniak-Szymanowska, A.[60]	2022	Poland	69.4	74	50	MNA-SF≤11	≥60y	NR
177	Kobayashi, H.[67]	2022	Japan	84	37	120	MNA-SF≤11	≥60y	NR
178	Koroušić Seljak, B.[69]	2020	Slovenia	NR	99	108	MNA-SF≤11	≥60y	NR
179	Lueg, G.[85]	2020	Germany	82.2	76	121	MNA-SF≤11	≥60y	Others
180	Makwana, N. R.[89]	2019	India	NR	85	78	MNA-SF≤11	≥60y	NR
181	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	MNA-SF≤11	≥60y	DP
182	Naaman, R. K.[102]	2023	Saudi Arabia	73	47	53	MNA-SF≤11	≥60y	Others
183	Nozawa, Y.[105]	2023	Japan	70.1	209	127	MNA-SF≤11	≥60y	NR
184	Oner O.[110]	2024	Turkey	76.9	48	48	MNA-SF≤11	≥60y	NR
185	Ostrowska, J. M.[113]	2019	Poland	NR	15	87	MNA-SF≤11	≥60y	NR
186	Pham Thi Lan A.[118]	2024	Vietnam	74.6	54	54	MNA-SF≤11	≥60y	NR
187	Ruiz-Rosso R[131]	2024	Brazil	82.2	100	139	MNA-SF≤11	≥60y	NR
188	Sanz-París, A.[135]	2020	Spain	NR	83	76	MNA-SF≤11	≥60y	NR
189	Thiam, C. N.[147]	2022	Malaysia	74.4	NR	NR	MNA-SF≤11	≥60y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
171	Carretero Gómez, J.[22]	European	High	NR	461	619
172	Carvalho, J.[23]	Americas	Upper middle	NR	46	138
173	Efendioglu, E. M.[41]	European	Upper middle	NR	118	136
174	Fukui, S.[44]	Western Pacific	High	NR	127	300
175	Genest, F.[46]	European	High	NR	38	107
176	Kaluzniak-Szymanowska, A.[60]	European	High	NR	38	124
177	Kobayashi, H.[67]	Western Pacific	High	24h	124	157
178	Koroušić Seljak, B.[69]	European	High	NR	87	106
179	Lueg, G.[85]	European	High	24h	164	197
180	Makwana, N. R.[89]	South-East Asia	Lower middle	48h	99	163
181	Matsumoto, Y.[93]	Western Pacific	High	24h	253	487
182	Naaman, R. K.[102]	Eastern Mediterranean	High	48h	75	100
183	Nozawa, Y.[105]	Western Pacific	High	NR	157	336
184	Oner O.[110]	European	Upper middle	24h	46	96
185	Ostrowska, J. M.[113]	European	High	NR	67	102
186	Pham Thi Lan A.[118]	Western Pacific	Lower middle	48h	78	108
187	Ruiz-Rosso R[131]	Americas	Upper middle	48h	120	239
188	Sanz-París, A.[135]	European	High	72h	159	159
189	Thiam, C. N.[147]	Western Pacific	Upper middle	24h	55	73

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
190	Tran, T. P.[150]	2021	Vietnam	75.5	NR	587	MNA-SF≤11	≥60y	DP
191	Kumar, S.[70]	2025	India	69.1	53	47	MNA-SF≤11	≥60y	NR
192	Wang, J. J.[155]	2023	China	63	1004	509	MNA-SF≤11	≥60y	NR
193	Xu, J. Y.[161]	2020	China	78	NR	NR	MNA-SF≤11	≥60y	NR
194	Yuksel, B.[168]	2022	Turkey	69.6	109	NR	MNA-SF≤11	≥60y	NR
195	Zhang, Q.[170]	2022	China	70	193	72	MNA-SF≤11	≥60y	Others
196	Zheng, J.[173]	2023	China	NR	NR	NR	MNA-SF≤11	≥60y	NR
197	Adly, N. N.[2]	2020	Egypt	68.7	NR	NR	8≤MNA-SF<11	≥60y	NR
198	Alvarez-Larruy, M.[7]	2023	Spain	71.8	28	17	8≤MNA-SF<11	≥60y	NR
199	Borges, K.[14]	2022	Spain	84.3	10	80	8≤MNA-SF<11	≥60y	NR
200	Carretero Gómez, J.[22]	2023	Spain	76	306	313	8≤MNA-SF<11	≥60y	NR
201	Carvalho, J.[23]	2022	Brazil	NR	NR	NR	8≤MNA-SF<11	≥60y	NR
202	Efendioglu, E. M.[41]	2022	Turkey	74.9	50	86	8≤MNA-SF<11	≥60y	Others
203	Kobayashi, H.[67]	2022	Japan	84	37	120	8≤MNA-SF<11	≥60y	NR
204	Koroušić Seljak, B.[69]	2020	Slovenia	NR	99	108	8≤MNA-SF<11	≥60y	NR
205	Lueg, G.[85]	2020	Germany	82.2	76	121	8≤MNA-SF<11	≥60y	Others
206	Makwana, N. R.[89]	2019	India	NR	85	78	8≤MNA-SF<11	≥60y	NR
207	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	8≤MNA-SF<11	≥60y	DP
208	Kumar, S.[70]	2025	India	69.1	53	47	8≤MNA-SF<11	≥60y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
190	Tran, T. P.[150]	Western Pacific	Lower middle	NR	721	1007
191	Kumar, S.[70]	South-East Asia	Lower middle	NR	57	Kumar, S.
192	Wang, J. J.[155]	Western Pacific	Upper middle	24h	1102	1513
193	Xu, J. Y.[161]	Western Pacific	Upper middle	24h	3299	6519
194	Yuksel, B.[168]	European	Upper middle	NR	83	200
195	Zhang, Q.[170]	Western Pacific	Upper middle	72h	177	265
196	Zheng, J.[173]	Western Pacific	Upper middle	24h	2688	2810
197	Adly, N. N.[2]	Eastern Mediterranean	Lower middle	48h	71	190
198	Alvarez-Larruy, M.[7]	European	High	NR	15	45
199	Borges, K.[14]	European	High	NR	45	90
200	Carretero Gómez, J.[22]	European	High	NR	233	619
201	Carvalho, J.[23]	Americas	Upper middle	NR	43	138
202	Efendioglu, E. M.[41]	European	Upper middle	NR	64	136
203	Kobayashi, H.[67]	Western Pacific	High	24h	82	157
204	Koroušić Seljak, B.[69]	European	High	NR	45	106
205	Lueg, G.[85]	European	High	24h	95	197
206	Makwana, N. R.[89]	South-East Asia	Lower middle	48h	82	163
207	Matsumoto, Y.[93]	Western Pacific	High	24h	165	487
208	Kumar, S.[70]	South-East Asia	Lower middle	NR	40	100

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
209	Naaman, R. K.[102]	2023	Saudi Arabia	73	47	53	8≤MNA-SF<11	≥60y	Others
210	Thiam, C. N.[147]	2022	Malaysia	74.4	NR	NR	8≤MNA-SF<11	≥60y	NR
211	Tran, T. P.[150]	2021	Vietnam	75.5	NR	587	8≤MNA-SF<11	≥60y	DP
212	Yuksel, B.[168]	2022	Turkey	69.6	109	NR	8≤MNA-SF<11	≥60y	NR
213	Zheng, J.[173]	2023	China	NR	NR	NR	8≤MNA-SF<11	≥60y	NR
214	Alvarez-Altamirano, K[6]	2024	Mexico	49.7	NR	NR	2step-GLIM, NRS2002	≥18y	NR
215	Chen, L. R.[28]	2022	China	74.7	1634	1100	2step-GLIM, NRS2002	≥18y	DP
216	Dai, L. L.[35]	2022	China	60.7	433	250	2step-GLIM, NRS2002	≥18y	NR
217	Guo, F.[52]	2023	China	39.1	54	44	2step-GLIM, NRS2002	≥18y	Others
218	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	2step-GLIM, NRS2002	≥18y	NR
219	Kong, X.[68]	2025	China	69	117	43	2step-GLIM, NRS2002	≥18y	NR
220	Leandro-Merhi, V. A.[74]	2023	Brazil	74.2	314	186	2step-GLIM, NRS2002	≥18y	NR
221	Lehmann, U.[76]	2025	Switzerland	73	289	269	2step-GLIM, NRS2002	≥18y	DP
222	Liu, C. Y.[79]	2021	China	NR	1523	865	2step-GLIM, NRS2002	≥18y	NR
223	Liu, J. F.[81]	2025	China	NR	190	110	2step-GLIM, NRS2002	≥18y	NR
224	Liu, Y.[84]	2025	China	61.6	31302	23350	2step-GLIM, NRS2002	≥18y	DP
225	Ma, Wei[87]	2024	China	57	252	NR	2step-GLIM, NRS2002	≥18y	NR
226	Munk, T.[100]	2025	Denmark	75	60	64	2step-GLIM, NRS2002	≥18y	NR
227	Qing H.[123]	2024	China	NR	14234	9905	2step-GLIM, NRS2002	≥18y	DP

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
209	Naaman, R. K.[102]	Eastern Mediterranean	High	48h	27	100
210	Thiam, C. N.[147]	Western Pacific	Upper middle	24h	27	73
211	Tran, T. P.[150]	Western Pacific	Lower middle	NR	547	1007
212	Yuksel, B.[168]	European	Upper middle	NR	70	200
213	Zheng, J.[173]	Western Pacific	Upper middle	24h	765	2810
214	Alvarez-Altamirano, K[6]	Americas	Upper middle	72h	374	913
215	Chen, L. R.[28]	Western Pacific	Upper middle	NR	536	2734
216	Dai, L. L.[35]	Western Pacific	Upper middle	24h	114	683
217	Guo, F.[52]	Western Pacific	Upper middle	NR	79	98
218	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	120	290
219	Kong, X.[68]	Western Pacific	Upper middle	24h	66	160
220	Leandro-Merhi, V. A.[74]	Americas	Upper middle	24h	100	500
221	Lehmann, U.[76]	European	High	72h	199	558
222	Liu, C. Y.[79]	Western Pacific	Upper middle	24h	929	2388
223	Liu, J. F.[81]	Western Pacific	Upper middle	NR	99	300
224	Liu, Y.[84]	Western Pacific	Upper middle	NR	7740	54652
225	Ma, Wei[87]	Western Pacific	Upper middle	24h	143	440
226	Munk, T.[100]	European	High	24h	58	124
227	Qing H.[123]	Western Pacific	Upper middle	NR	4559	24139

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
228	Wang, W.[157]	2023	China	60.7	305	141	2step-GLIM, NRS2002	≥18y	Others
229	Wei, W.[158]	2023	China	41.3	NR	263	2step-GLIM, NRS2002	≥18y	Others
230	Xu, J. Y.[161]	2020	China	78	NR	NR	2step-GLIM, NRS2002	≥18y	NR
231	Yang J.-Y.[163]	2024	China	69.1	77	44	2step-GLIM, NRS2002	≥18y	NR
232	Deng, L. M.[38]	2025	China	NR	1863	1326	2step-GLIM, NRS2002	≥18y	DP
233	Yu, Y.[167]	2021	China	NR	72	67	2step-GLIM, NRS2002	≥18y	Others
234	Zhang, Y.[171]	2022	China	38.5	163	55	2step-GLIM, NRS2002	≥18y	NR
235	Zhou, L. P.[176]	2021	China	64.8	1485	724	2step-GLIM, NRS2002	≥18y	NR
236	Li, Y.[77]	2023	China	77.4	68	148	2step-GLIM, NRS2002	≥60y	Others
237	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	2step-GLIM, NRS2002	≥65y	DP
238	Kaluzniak-Szymanowska, A.[60]	2022	Poland	69.4	74	50	2step-GLIM, MNA-SF	≥60y	NR
239	Kobayashi, H.[67]	2022	Japan	84	37	120	2step-GLIM, MNA-SF	≥60y	DP
240	Sanz-París, A.[135]	2020	Spain	NR	83	76	2step-GLIM, MNA-SF	≥60y	DP
241	Shimizu, A.[137]	2020	Japan	80	154	181	2step-GLIM, MNA-SF	≥60y	NR
242	Xie, L. L.[160]	2022	China	80	637	498	2step-GLIM, MNA-SF	≥60y	NR
243	Xu, J. Y.[161]	2020	China	78	NR	NR	2step-GLIM, MNA-SF	≥60y	NR
244	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	2step-GLIM, MNA-SF	≥65y	DP
245	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	1step-GLIM, severe	≥18y	DP
246	Cervera-Díaz, M. D. C.[25]	2023	Spain	86.2	34	152	1step-GLIM, severe	≥18y	DP

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
228	Wang, W.[157]	Western Pacific	Upper middle	48h	97	682
229	Wei, W.[158]	Western Pacific	Upper middle	NR	388	605
230	Xu, J. Y.[161]	Western Pacific	Upper middle	24h	1790	6519
231	Yang J.-Y.[163]	Western Pacific	Upper middle	48h	45	121
232	Deng, L. M.[38]	Western Pacific	Upper middle income	48h	791	3189
233	Yu, Y.[167]	Western Pacific	Upper middle	NR	25	139
234	Zhang, Y.[171]	Western Pacific	Upper middle	48h	145	238
235	Zhou, L. P.[176]	Western Pacific	Upper middle	NR	603	2209
236	Li, Y.[77]	Western Pacific	Upper middle	24h	76	216
237	Bech, C. B.[13]	European	High	96h	62	114
238	Kaluzniak-Szymanowska, A.[60]	European	High	NR	28	124
239	Kobayashi, H.[67]	Western Pacific	High	24h	116	157
240	Sanz-París, A.[135]	European	High	72h	85	159
241	Shimizu, A.[137]	Western Pacific	High	NR	217	335
242	Xie, L. L.[160]	Western Pacific	Upper middle	NR	762	1153
243	Xu, J. Y.[161]	Western Pacific	Upper middle	24h	2128	6519
244	Bech, C. B.[13]	European	High	96h	54	114
245	Bech, C. B.[13]	European	High	96h	37	114
246	Cervera-Díaz, M. D. C.[25]	European	High	48h	77	186

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
247	Huang, S. S.[57]	2022	China	36	52	21	1step-GLIM, severe	≥18y	Others
248	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	1step-GLIM, severe	≥18y	NR
249	Kaźmierczak-Siedlecka, K.[66]	2020	Poland	58.9	NR	NR	1step-GLIM, severe	≥18y	DP
250	Kong, X.[68]	2025	China	69	117	43	1step-GLIM, severe	≥18y	NR
251	Maeda, K.[88]	2020	Japan	67.3	NR	NR	1step-GLIM, severe	≥18y	NR
252	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	1step-GLIM, severe	≥18y	NR
253	Mitani, A.[98]	2021	Japan	NR	NR	NR	1step-GLIM, severe	≥18y	DP
254	Nishioka, S.[104]	2021	Japan	80	355	246	1step-GLIM, severe	≥18y	NR
255	Ottestad I.[114]	2024	Norway	65	207	235	1step-GLIM, severe	≥18y	NR
256	Ouaijan, K.[115]	2023	Lebanon	60	188	155	1step-GLIM, severe	≥18y	NR
257	Rajan, S. [125]	2025	India	52.7	0	130	1step-GLIM, severe	≥18y	NR
258	Reyes L.M.[127]	2024	Spain	63.6	565	471	1step-GLIM, severe	≥18y	NR
259	Rosato, E.[130]	2021	Italy	55	16	86	1step-GLIM, severe	≥18y	NR
260	Skeie, E.[139]	2020	Norway	68	3291	2819	1step-GLIM, severe	≥18y	NR
261	Slettahjell, HB[141]	2024	Denmark	51.4	16	50	1step-GLIM, severe	≥18y	NR
262	Song, M. M.[143]	2022	China	56.8	4338	4140	1step-GLIM, severe	≥18y	NR
263	Wang J[153]	2024	China	NR	94	32	1step-GLIM, severe	≥18y	DP
264	Wang, L.[156]	2023	China	70	82	105	1step-GLIM, severe	≥18y	NR
265	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	1step-GLIM, moderate	≥18y	DP

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
247	Huang, S. S.[57]	Western Pacific	Upper middle	24h	22	73
248	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	84	290
249	Kaźmierczak-Siedlecka, K.[66]	European	High	NR	23	28
250	Kong, X.[68]	Western Pacific	Upper middle	24h	48	160
251	Maeda, K.[88]	Western Pacific	High	NR	432	4796
252	Matsumoto, Y.[93]	Western Pacific	High	24h	90	490
253	Mitani, A.[98]	Western Pacific	High	NR	107	177
254	Nishioka, S.[104]	Western Pacific	High	NR	114	601
255	Ottestad I.[114]	European	High	24h	25	442
256	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	49	343
257	Rajan, S. [125]	South-East Asia	Lower middle	NR	15	130
258	Reyes L.M.[127]	European	High	NR	421	1036
259	Rosato, E.[130]	European	High	NR	4	102
260	Skeie, E.[139]	European	High	Perioperative	955	6110
261	Slettahjell, HB[141]	European	High	NR	14	66
262	Song, M. M.[143]	Western Pacific	Upper middle	48h	732	8478
263	Wang J[153]	Western Pacific	Upper middle	48h	10	126
264	Wang, L.[156]	Western Pacific	Upper middle	24h	49	140
265	Bech, C. B.[13]	European	High	96h	36	114

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
266	Cervera-Díaz, M. D. C.[25]	2023	Spain	86.2	34	152	1step-GLIM, moderate	≥18y	DP
267	Huang, S. S.[57]	2022	China	36	52	21	1step-GLIM, moderate	≥18y	Others
268	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	1step-GLIM, moderate	≥18y	NR
269	Kong, X.[68]	2025	China	69	117	43	1step-GLIM, moderate	≥18y	NR
270	Maeda, K.[88]	2020	Japan	67.3	NR	NR	1step-GLIM, moderate	≥18y	NR
271	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	1step-GLIM, moderate	≥18y	DP
272	Mitani, A.[98]	2021	Japan	NR	NR	NR	1step-GLIM, moderate	≥18y	DP
273	Nishioka, S.[104]	2021	Japan	80	355	246	1step-GLIM, moderate	≥18y	NR
274	Ottestad I.[114]	2024	Norway	65	207	235	1step-GLIM, moderate	≥18y	NR
275	Ouaijan, K.[115]	2023	Lebanon	60	188	155	1step-GLIM, moderate	≥18y	NR
276	Rajan, S. [125]	2025	India	52.7	0	130	1step-GLIM, moderate	≥18y	NR
277	Reyes L.M.[127]	2024	Spain	63.6	565	471	1step-GLIM, moderate	≥18y	NR
278	Rosato, E.[130]	2021	Italy	55	16	86	1step-GLIM, moderate	≥18y	NR
279	Skeie, E.[139]	2020	Norway	68	3291	2819	1step-GLIM, moderate	≥18y	NR
280	Slettahjell, HB[141]	2024	Denmark	51.4	16	50	1step-GLIM, moderate	≥18y	NR
281	Song, M. M.[143]	2022	China	56.8	4338	4140	1step-GLIM, moderate	≥18y	NR
282	Wang J[153]	2024	China	NR	94	32	1step-GLIM, moderate	≥18y	DP
283	Wang, L.[156]	2023	China	70	82	105	1step-GLIM, moderate	≥18y	NR
284	Cervera-Díaz, M. D. C.[25]	2023	Spain	86.2	34	152	1step-GLIM, male	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
266	Cervera-Díaz, M. D. C.[25]	European	High	48h	42	186
267	Huang, S. S.[57]	Western Pacific	Upper middle	24h	21	73
268	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	57	290
269	Kong, X.[68]	Western Pacific	Upper middle	24h	35	160
270	Maeda, K.[88]	Western Pacific	High	NR	432	4796
271	Matsumoto, Y.[93]	Western Pacific	High	24h	75	490
272	Mitani, A.[98]	Western Pacific	High	NR	155	177
273	Nishioka, S.[104]	Western Pacific	High	NR	60	601
274	Ottestad I.[114]	European	High	24h	103	442
275	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	73	343
276	Rajan, S. [125]	South-East Asia	Lower middle	NR	57	130
277	Reyes L.M.[127]	European	High	NR	234	1036
278	Rosato, E.[130]	European	High	NR	13	102
279	Skeie, E.[139]	European	High	Perioperative	1206	6110
280	Slettahjell, HB[141]	European	High	NR	27	66
281	Song, M. M.[143]	Western Pacific	Upper middle	48h	1122	8478
282	Wang J[153]	Western Pacific	Upper middle	48h	36	126
283	Wang, L.[156]	Western Pacific	Upper middle	24h	45	140
284	Cervera-Díaz, M. D. C.[25]	European	High	48h	27	34

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
285	Huang, S. S.[57]	2022	China	36	52	21	1step-GLIM, male	≥18y	NR
286	Ouaijan, K.[115]	2023	Lebanon	60	188	155	1step-GLIM, male	≥18y	NR
287	Reyes L.M.[127]	2024	Spain	63.6	565	471	1step-GLIM, male	≥18y	DP
288	Tan S.[146]	2024	China	56.6	170	37	1step-GLIM, male	≥18y	NR
289	Cervera-Díaz, M. D. C.[25]	2023	Spain	86.2	34	152	1step-GLIM, female	≥18y	NR
290	Ouaijan, K.[115]	2023	Lebanon	60	188	155	1step-GLIM, female	≥18y	NR
291	Reyes L.M.[127]	2024	Spain	63.6	565	471	1step-GLIM, female	≥18y	DP
292	Tan S.[146]	2024	China	56.6	170	37	1step-GLIM, female	≥18y	NR
293	Alvarez-Altamirano, K[6]	2024	Mexico	49.7	NR	NR	1step-GLIM	≥18y	DP
294	Azman, M.[9]	2021	Malaysia	58.5	37	13	1step-GLIM	≥18y	NR
295	Balci, C.[10]	2021	Turkey	62.2	100	131	1step-GLIM	≥18y	Others
296	Bannert, K.[11]	2023	Germany	55.5	112	75	1step-GLIM	≥18y	NR
297	Bech, C. B.[13]	2023	Denmark	85.5	NR	NR	1step-GLIM	≥18y	DP
298	Boulhosa, R. S. S. B.[15]	2020	Brazil	56.8	NR	NR	1step-GLIM	≥18y	DP
299	Cervera-Díaz, M. D. C.[25]	2023	Spain	86.2	34	152	1step-GLIM	≥18y	DP
300	Chen, W.[29]	2023	China	47.5	9858	5083	1step-GLIM	≥18y	DP
301	Clement, DSVM[31]	2024	UK	67	55	63	1step-GLIM	≥18y	NR
302	Cortes, R[33]	2024	Spain	75.2	150	98	1step-GLIM	≥18y	NR
303	De Groot, L. M.[36]	2020	Australia	61.9	64	182	1step-GLIM	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
285	Huang, S. S.[57]	Western Pacific	Upper middle	24h	32	52
286	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	94	188
287	Reyes L.M.[127]	European	High	NR	379	565
288	Tan S.[146]	Western Pacific	Upper middle	24h	69	170
289	Cervera-Díaz, M. D. C.[25]	European	High	48h	110	152
290	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	78	155
291	Reyes L.M.[127]	European	High	NR	276	471
292	Tan S.[146]	Western Pacific	Upper middle	24h	20	37
293	Alvarez-Altamirano, K[6]	Americas	Upper middle	72h	404	913
294	Azman, M.[9]	Western Pacific	Upper middle	NR	25	50
295	Balci, C.[10]	European	Upper middle	48h	83	231
296	Bannert, K.[11]	European	High	NR	96	187
297	Bech, C. B.[13]	European	High	96h	73	114
298	Boulhosa, R. S. S. B.[15]	Americas	Upper middle	48h	95	166
299	Cervera-Díaz, M. D. C.[25]	European	High	48h	119	186
300	Chen, W.[29]	Western Pacific[56]	Upper middle	NR	6017	14941
301	Clement, DSVM[31]	European	High	NR	88	118
302	Cortes, R[33]	European	High	48h	124	248
303	De Groot, L. M.[36]	Western Pacific	High	NR	77	220

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
304	Huang, D. D.[56]	2022	China	66	1000	359	1step-GLIM	≥18y	NR
305	Huang, S. S.[57]	2022	China	36	52	21	1step-GLIM	≥18y	NR
306	Jazinaki, Mostafa[58]	2024	Iran	58	177	113	1step-GLIM	≥18y	Others
307	Kong, X.[68]	2025	China	69	117	43	1step-GLIM	≥18y	NR
308	Lee, B.[75]	2021	Korea	64.8	38	37	1step-GLIM	≥18y	NR
309	Maeda, K.[88]	2020	Japan	67.3	NR	NR	1step-GLIM	≥18y	DP
310	Marquez Mesa E.[91]	2024	Spain	65.3	270	240	1step-GLIM	≥18y	NR
311	Matsumoto, Y.[93]	2020	Japan	69.5	271	219	1step-GLIM	≥18y	DP
312	Mitani, A.[98]	2021	Japan	NR	NR	NR	1step-GLIM	≥18y	NR
313	Muresan, B. T.[101]	2022	Spain	66.2	71	36	1step-GLIM	≥18y	DP
314	Nguyen, L. H. T.[103]	2023	Vietnam	68	74	89	1step-GLIM	≥18y	DP
315	Nishioka, S.[104]	2021	Japan	80	355	246	1step-GLIM	≥18y	DP
316	Nozoe, M.[106]	2021	Japan	72	76	39	1step-GLIM	≥18y	NR
317	Ottestad I.[114]	2024	Norway	65	207	235	1step-GLIM	≥18y	NR
318	Ouaijan, K.[115]	2023	Lebanon	60	188	155	1step-GLIM	≥18y	NR
319	Ozorio, G. A.[116]	2023	Brazil	61	457	428	1step-GLIM	≥18y	NR
320	Pironi, L.[120]	2021	Italy	74	147	121	1step-GLIM	≥18y	DP
321	Qing H.[123]	2024	China	NR	14234	9905	1step-GLIM	≥18y	NR
322	Rajan, S. [125]	2025	India	52.7	0	130	1step-GLIM	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
304	Huang, D. D.[56]	Western Pacific	Upper middle	NR	383	1359
305	Huang, S. S.[57]	Western Pacific	Upper middle	24h	43	73
306	Jazinaki, Mostafa[58]	Eastern Mediterranean	Upper middle	48h	141	290
307	Kong, X.[68]	Western Pacific	Upper middle	24h	83	160
308	Lee, B.[75]	Western Pacific	High	24h	75	228
309	Maeda, K.[88]	Western Pacific	High	NR	864	4796
310	Marquez Mesa E.[91]	European	High	72h	235	510
311	Matsumoto, Y.[93]	Western Pacific	High	24h	165	490
312	Mitani, A.[98]	Western Pacific	High	NR	155	177
313	Muresan, B. T.[101]	European	High	48h	83	107
314	Nguyen, L. H. T.[103]	Western Pacific	Lower middle	24h	102	163
315	Nishioka, S.[104]	Western Pacific	High	NR	174	601
316	Nozoe, M.[106]	Western Pacific	High	NR	33	115
317	Ottestad I.[114]	European	High	24h	128	442
318	Ouaijan, K.[115]	Eastern Mediterranean	Lower middle	48h	122	343
319	Ozorio, G. A.[116]	Americas	Upper middle	24h	199	663
320	Pironi, L.[120]	European	High	24h	207	268
321	Qing H.[123]	Western Pacific	Upper middle	NR	4559	24139
322	Rajan, S. [125]	South-East Asia	Lower middle	NR	73	130

Supplementary Table 6. Characteristics of selected cross-sectional studies using different malnutrition screening or assessment tools (n=170) (cont.)

S/no	First author	Year	Country	Mean age	Male	Female	Tool	Population	Applier
323	Reiner, J.[126]	2022	Germany	43.7	56	45	1step-GLIM	≥18y	NR
324	Reyes L.M.[127]	2024	Spain	63.6	565	471	1step-GLIM	≥18y	NR
325	Rosato, E.[130]	2021	Italy	55	16	86	1step-GLIM	≥18y	NR
326	Sánchez-Torralvo, F. J.[132]	2022	Spain	60.4	157	125	1step-GLIM	≥18y	NR
327	Santos, M. L. D. D.[134]	2022	Brazil	60	142	189	1step-GLIM	≥18y	NR
328	Skeie, E.[139]	2020	Norway	68	3291	2819	1step-GLIM	≥18y	NR
329	Slettahjell, HB[141]	2024	Denmark	51.4	16	50	1step-GLIM	≥18y	DP
330	Song, M. M.[143]	2022	China	56.8	4338	4140	1step-GLIM	≥18y	NR
331	Tan S.[146]	2024	China	56.6	170	37	1step-GLIM	≥18y	DP
332	Thomas, J.[148]	2022	Australia	67.3	157	67	1step-GLIM	≥18y	DP
333	Trollebø, M. A.[151]	2022	Norway	71	174	154	1step-GLIM	≥18y	NR
334	Wang J[153]	2024	China	NR	94	32	1step-GLIM	≥18y	NR
335	Wang, L.[156]	2023	China	70	82	105	1step-GLIM	≥18y	NR
336	Yang J.-Y.[163]	2024	China	69.1	77	44	1step-GLIM	≥18y	NR
337	Yang, W. [165]	2023	China	64	177	186	1step-GLIM	≥18y	NR
338	Yogesh, M[166]	2024	India	48	90	70	1step-GLIM	≥18y	NR
339	Zhang, Z.[172]	2021	China	56.8	383	254	1step-GLIM	≥18y	Others
340	Zhou B[174]	2024	China	58	3461	2352	1step-GLIM	≥18y	NR
341	Zuo J.[179]	2024	China	68	224	92	1step-GLIM	≥18y	NR

S/no	First author	Region	Income level	Timepoint	Positive patients (n)	Sample size (N)
323	Reiner, J.[126]	European	High	NR	64	202
324	Reyes L.M.[127]	European	High	NR	655	1036
325	Rosato, E.[130]	European	High	NR	17	102
326	Sánchez-Torralvo, F. J.[132]	European	High	24h	216	282
327	Santos, M. L. D. D.[134]	Americas	Upper middle	72h	107	331
328	Skeie, E.[139]	European	High	Perioperative	2161	6110
329	Slettahjell, HB[141]	European	High	NR	41	66
330	Song, M. M.[143]	Western Pacific	Upper middle	48h	1854	8478
331	Tan S.[146]	Western Pacific	Upper middle	24h	89	207
332	Thomas, J.[148]	Western Pacific	High	72h	64	224
333	Trollebø, M. A.[151]	European	High	NR	114	326
334	Wang J[153]	Western Pacific	Upper middle	48h	46	126
335	Wang, L.[156]	Western Pacific	Upper middle	24h	94	140
336	Yang J.-Y.[163]	Western Pacific	Upper middle	48h	45	121
337	Yang, W. [165]	Western Pacific	Upper middle	NR	132	363
338	Yogesh, M[166]	South-East Asia	Lower middle	NR	73	160
339	Zhang, Z.[172]	Western Pacific	Upper middle	72h	180	637
340	Zhou B[174]	Western Pacific	Upper middle	24h	1328	5821
341	Zuo J.[179]	Western Pacific	Upper middle	NR	151	316

NR: not reported. DP: dietitian participated.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
NRS2002≥3, ≥18 years	90	0.41(0.35,0.49)	123000	<0.001	99.9%
Gender					
≥18 years					
Female	9	0.48(0.39,0.59)	264	<0.001	97.0%
Male	8	0.53(0.44,0.65)	289	<0.001	97.6%
Between groups			0.53	0.467	
≥65 years					
Female	3	0.21(0.06,0.78)	1720	<0.001	99.9%
Male	3	0.13(0.08,0.20)	59.1	<0.001	96.6%
Between groups			0.48	0.49	
Between groups			33.4	<0.001	
Age					
≥ 65 years	16	0.51(0.35,0.75)	25400	<0.001	99.9%
< 65 years	6	0.21(0.09,0.47)	860	<0.001	99.4%
Between groups			3.79	0.0516	
Region					
Western Pacific	43	0.39(0.31,0.49)	61800	<0.001	99.9%
European	30	0.39(0.29,0.54)	21600	<0.001	99.9%
Americas	8	0.53(0.43,0.67)	243	<0.001	97.1%
Eastern Mediterranean	8	0.53(0.43,0.65)	1090	<0.001	99.4%
South-East Asia	1	0.74(0.68,0.80)	0	—	—
Between groups			44.3	<0.001	
Country					
China	42	0.38(0.30,0.49)	61700	<0.001	99.9%
Turkey	8	0.32(0.13,0.78)	7820	<0.001	99.9%
Iran	6	0.64(0.52,0.78)	829	<0.001	99.4%
Norway	5	0.36(0.24,0.54)	334	<0.001	98.8%
Brazil	5	0.55(0.38,0.79)	189	<0.001	97.9%
Mexico	3	0.51(0.39,0.66)	42	<0.001	95.2%
Portugal	3	0.68(0.48,0.95)	102	<0.001	98.0%
Italy	3	0.53(0.37,0.77)	59.1	<0.001	96.6%
Spain	2	0.40(0.10,1.00)	183	<0.001	99.5%
Germany	2	0.20(0.07,0.56)	22.9	<0.001	95.6%
Switzerland	2	0.39(0.17,0.91)	68.6	<0.001	98.5%
Palestine	1	0.24(0.18,0.32)	0	—	—
Slovenia	1	0.67(0.58,0.76)	0	—	—
Denmark	1	0.65(0.58,0.74)	0	—	—
Vietnam	1	0.63(0.56,0.71)	0	—	—
Finland	1	0.30(0.29,0.32)	0	—	—
Lebanon	1	0.31(0.27,0.37)	0	—	—
Indonesia	1	0.74(0.68,0.80)	0	—	—
Croatia	1	0.40(0.33,0.49)	0	—	—
Between groups			511	<0.001	
Timepoint					
< 24h	26	0.40(0.33,0.48)	2190	<0.001	98.9%
< 48h	16	0.43(0.35,0.53)	1790	<0.001	99.2%
< 72h	5	0.46(0.32,0.66)	761	<0.001	99.5%
Between groups			0.72	69.9%	
Gender ratio (female: male)					
<1	60	0.41(0.33,0.50)	82000	<0.001	99.9%
≥1	17	0.41(0.33,0.50)	843	<0.001	98.1%
Between groups			0	0.971	
Applier					
Dietitian participated	27	0.44(0.31,0.63)	76000	<0.001	100%
Others	21	0.37(0.29,0.47)	4230	<0.001	99.5%
Between groups			0.65	0.419	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

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Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
NRS2002≥3, ≥18 years	90	0.41(0.35,0.49)	123000	<0.001	99.9%
Income level					
Upper middle income	65	0.41(0.34,0.51)	119000	<0.001	99.9%
High income	22	0.42(0.35,0.52)	2880	<0.001	99.3%
Lower middle income	3	0.36(0.20,0.65)	67.5	<0.001	97.0%
Between groups			0.25	0.883	
ICU					
ICU=0	78	0.39(0.33,0.47)	65300	<0.001	99.9%
ICU=1	12	0.60(0.33,1.00)	54600	<0.001	100%
Between groups			1.91	0.167	
MNA-SF≤11, ≥60 years	30	0.62(0.57,0.67)	4460	<0.001	99.3%
Severity					
8≤ MNA-SF ≤11, at risk of malnutrition	17	0.40(0.34,0.47)	325	<0.001	95.1%
MNA-SF≤7, malnourished	19	0.23(0.17,0.31)	1180	<0.001	98.5%
Between groups			9.81	0.002	
Region					
European	13	0.62(0.54,0.72)	600	<0.001	98.0%
WesternPacific	11	0.64(0.53,0.78)	3170	<0.001	99.7%
EasternMediterranean	2	0.65(0.49,0.87)	11.7	<0.001	91.5%
Americas	2	0.42(0.28,0.62)	8.89	0.003	88.8%
South-EastAsia	2	0.60(0.54,0.66)	0.33	0.566	0
Between groups			4.25	0.373	
Country					
Spain	4	0.73(0.58,0.91)	199	<0.001	98.5%
Japan	4	0.54(0.40,0.71)	98.5	<0.001	97.0%
China	4	0.70(0.49,1.00)	2660	<0.001	99.9%
Turkey	3	0.56(0.33,0.96)	86.3	<0.001	97.7%
Brazil	2	0.42(0.28,0.62)	8.89	0.003	88.8%
Germany	2	0.55(0.24,1.00)	40.3	<0.001	97.5%
Poland	2	0.46(0.22,0.95)	24.8	<0.001	96.0%
India	2	0.60(0.54,0.66)	0.33	0.566	0.00%
Vietnam	2	0.72(0.69,0.74)	0.03	0.862	0.00%
Egypt	1	0.56(0.49,0.63)	—	—	—
Denmark	1	0.69(0.60,0.78)	—	—	—
Slovenia	1	0.82(0.75,0.90)	—	—	—
SaudiArabia	1	0.75(0.67,0.84)	—	—	—
Malaysia	1	0.76(0.66,0.86)	—	—	—
Between groups			51.6	<0.001	
Timepoint					
< 24h	8	0.68(0.53,0.87)	2810	<0.001	99.8%
< 48h	5	0.62(0.54,0.72)	30.9	<0.001	87.0%
< 72h	2	0.82(0.55,1.00)	85.9	<0.001	98.8%
Between groups			1.75	0.417	
Gender ratio (female: male)					
≥1	12	0.68(0.62,0.76)	168	<0.001	93.5%
<1	9	0.57(0.47,0.70)	998	<0.001	99.2%
Between groups			2.42	0.12	
Applier					
Others	4	0.78(0.69,0.87)	26.1	<0.001	88.5%
Dietitian participated	2	0.61(0.45,0.84)	44.8	<0.001	97.8%
Between groups			2.02	0.156	
Income level					
High income	15	0.61(0.52,0.71)	998	<0.001	98.6%
Upper middle income	10	0.60(0.48,0.75)	2920	<0.001	99.7%
Lower middle income	5	0.64(0.57,0.71)	23.6	<0.001	83.0%
Between group			0.38	0.826	
Stamp≥2, 1-17 years	6	0.55(0.44,0.68)	327	<0.001	98.5%

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
GLIM, ≥18 years	80	0.39(0.35,0.44)	19300	<0.001	99.6%
Region					
Western Pacific	48	0.36(0.31,0.42)	14600	<0.001	99.7%
European	23	0.48(0.41,0.55)	1200	<0.001	98.2%
Eastern Mediterranean	4	0.33(0.22,0.49)	101	<0.001	97.0%
Americas	3	0.42(0.35,0.50)	11.1	0.004	82.0%
South-East Asia	2	0.51(0.42,0.62)	3.22	0.073	68.9%
Between groups			11.8	0.019	
Country					
China	34	0.34(0.29,0.40)	11300	<0.001	99.7%
Japan	7	0.42(0.24,0.73)	1710	<0.001	99.6%
Spain	7	0.61(0.53,0.70)	112	<0.001	94.6%
Denmark	5	0.55(0.48,0.63)	11.4	0.022	64.8%
Brazil	4	0.33(0.22,0.49)	101	<0.001	97.0%
Germany	2	0.41(0.25,0.65)	14.8	<0.001	93.2%
Australia	2	0.32(0.26,0.39)	2.09	0.148	52.2%
Iran	2	0.45(0.39,0.53)	3.04	0.081	67.1%
Italy	2	0.37(0.08,1.00)	47	<0.001	97.9%
Mexico	2	0.43(0.40,0.46)	2.01	0.156	50.3%
India	2	0.51(0.42,0.62)	3.22	0.073	68.9%
Korea	1	0.33(0.27,0.40)	0	—	—
Malaysia	1	0.51(0.35,0.66)	0	—	—
Norway	3	0.33(0.30,0.38)	6.69	0.035	70.1%
Poland	1	0.23(0.16,0.31)	0	—	—
Portugal	1	0.77(0.66,0.85)	0	—	—
Switzerland	1	0.36(0.32,0.40)	0	—	—
Turkey	1	0.36(0.30,0.43)	0	—	—
UK	1	0.75(0.67,0.83)	0	—	—
Vietnam	1	0.63(0.56,0.71)	0	—	—
Between groups			263	<0.001	
Timepoint					
<24h	22	0.40(0.33,0.48)	2270	<0.001	99.1%
<48h	15	0.42(0.33,0.53)	1220	<0.001	98.9%
<72h	8	0.38(0.33,0.44)	83.4	<0.001	91.6%
Between groups			0.4	0.821	
Gender ratio (female: male)					
<1	52	0.36(0.31,0.42)	14600	<0.001	99.7%
≥1	16	0.47(0.40,0.56)	370	<0.001	95.9%
Between groups			5.47	1.90%	
Applier					
Dietitian participated	20	0.43(0.32,0.58)	10100	<0.001	99.8%
Others	8	0.33(0.26,0.40)	124	<0.001	94.4%
Between groups			2.32	0.128	
Income level					
Upper middle income	45	0.35(0.31,0.41)	12000	<0.001	99.6%
High income	31	0.44(0.37,0.52)	2970	<0.001	99.0%
Lower middle income	4	0.49(0.38,0.64)	39.2	<0.001	92.3%
Between groups			6.64	0.036	
One step GLIM, ≥18 years	44	0.42(0.37,0.48)	4860	<0.001	99.1%
Gender					
Male	4	0.54(0.43,0.69)	36.4	<0.001	91.8%
Female	3	0.56(0.50,0.62)	2.95	0.23	32.2%
Between groups			0.04	0.835	
Severity					
≥18 years					
Moderate	16	0.24(0.16,0.36)	3160	<0.001	99.5%
Severe	17	0.19(0.13,0.28)	2010	<0.001	99.2%
Between groups			0.61	0.434	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
GLIM, ≥18 years	80	0.39(0.35,0.44)	19300	<0.001	99.6%
Severity					
≥ 60 years					
Moderate	3	0.19(0.10,0.39)	43.2	<0.001	95.4%
Severe	3	0.30(0.18,0.50)	43	<0.001	95.3%
Between groups			0.92	0.337	
Between groups			2.07	0.559	
Region					
Western Pacific	22	0.38(0.32,0.46)	2940	<0.001	99.3%
European	15	0.48(0.39,0.58)	1110	<0.001	98.7%
Americas	3	0.38(0.25,0.58)	57.6	<0.001	96.5%
Eastern Mediterranean	2	0.42(0.31,0.57)	11	0.001	90.9%
South-East Asia	2	0.51(0.42,0.62)	3.22	0.07	68.9%
Between groups			5.3	0.258	
Country					
China	12	0.38(0.31,0.47)	1290	<0.001	99.1%
Spain	5	0.62(0.51,0.74)	106	<0.001	96.2%
Japan	4	0.35(0.14,0.91)	1450	<0.001	99.8%
Brazil	3	0.38(0.25,0.58)	57.6	<0.001	96.5%
Norway	3	0.33(0.30,0.38)	6.69	0.04	70.1%
Germany	2	0.41(0.25,0.65)	14.8	0.001	93.2%
Australia	2	0.32(0.26,0.39)	2.09	0.15	52.2%
Italy	2	0.37(0.08,1.00)	47	<0.001	97.9%
India	2	0.51(0.42,0.62)	3.22	0.07	68.9%
Denmark	1	0.62(0.52,0.75)	0	--	--
Mexico	1	0.44(0.41,0.48)	0	--	--
Malaysia	1	0.50(0.38,0.66)	0	--	--
Turkey	1	0.36(0.30,0.42)	0	--	--
UK	1	0.75(0.67,0.83)	0	--	--
Iran	1	0.49(0.43,0.55)	0	--	--
Korea	1	0.33(0.27,0.40)	0	--	--
Vietnam	1	0.63(0.55,0.71)	0	--	--
Lebanon	1	0.36(0.31,0.41)	0	--	--
Between groups			211	<0.001	
Timepoint					
< 24h	12	0.45(0.33,0.63)	1520	<0.001	99.3%
< 48h	8	0.43(0.28,0.64)	811	<0.001	99.1%
< 72h	5	0.36(0.29,0.44)	63.3	0.001	93.7%
Between groups			1.76	0.415	
Gender ratio (female: male)					
<1	29	0.41(0.36,0.47)	3020	<0.001	99.1%
≥1	11	0.43(0.35,0.55)	261	<0.001	96.2%
Between groups			0.17	0.68	
Applier					
Dietitian participated	10	0.43(0.33,0.57)	1200	<0.001	99.2%
Others	3	0.37(0.26,0.52)	38.9	<0.001	94.9%
Between groups			0.53	0.466	
Income level					
Upper middle income	20	0.40(0.34,0.47)	1460	<0.001	98.7%
High income	20	0.42(0.34,0.53)	2680	<0.001	99.3%
Lower middle income	4	0.49(0.38,0.64)	39.2	<0.001	92.3%
Between groups			1.73	0.422	

*$p<0.05$, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
Two step GLIM, NRS2002 – GLIM, ≥18 years	18	0.34(0.26,0.46)	5320	<0.001	99.7%
Region					
Western Pacific	15	0.33(0.24,0.45)	5130	<0.001	99.7%
European	2	0.41(0.31,0.53)	6.12	0.047	83.7%
Eastern Mediterranean	1	0.41(0.36,0.48)	0	—	—
Between groups			1.72	0.424	
Country					
China	14	0.32(0.23,0.45)	4900	<0.001	99.7%
Mexico	1	0.41(0.38,0.44)	0	—	—
Iran	1	0.41(0.36,0.48)	0	—	—
Switzerland	1	0.36(0.32,0.40)	0	—	—
Denmark	1	0.47(0.39,0.57)	0	—	—
Between groups			9.03	0.06	
Timepoint					
< 24h	6	0.32(0.26,0.40)	196	<0.001	97.4%
< 48h	4	0.37(0.24,0.57)	237	<0.001	98.7%
< 72h	2	0.39(0.34,0.44)	3.96	0.047	74.7%
Between groups			1.82	0.402	
Gender ratio (female: male)					
<1	13	0.32(0.23,0.45)	3520	<0.001	99.7%
≥1	1	0.47(0.39,0.57)	0	—	—
Between groups			3.59	0.058	
Applier					
Dietitian participated	6	0.37(0.20,0.67)	2690	<0.001	99.8%
Others	4	0.29(0.21,0.40)	69.9	<0.001	95.7%
Between groups			0.47	0.493	
Income level					
Upper-middle income	16	0.33(0.25,0.45)	5200	<0.001	99.7%
High income	2	0.41(0.31,0.53)	6.12	0.013	83.7%
Between groups			0.86	0.353	
Two step GLIM, MNA-SF – GLIM, ≥60 years	7	0.49(0.35,0.68)	860	<0.001	99.3%
Region					
Western Pacific	4	0.57(0.36,0.88)	837	<0.001	99.6%
European	3	0.40(0.27,0.59)	22.3	<0.001	91.0%
Between groups			1.33	0.249	
Country*					
China	2	0.46(0.23,0.93)	654	<0.001	99.8%
Japan	2	0.69(0.61,0.79)	4.52	0.034	77.9%
Spain	1	0.54(0.46,0.62)	0	—	—
Denmark	1	0.48(0.39,0.58)	0	—	—
Poland	1	0.23(0.17,0.32)	0	—	—
Between groups			42.9	<0.001	
Timepoint					
< 24h	2	0.53(0.22,1.00)	262	<0.001	99.6%
< 72h	1	0.54(0.46,0.62)	--	--	--
Between groups			0.04	0.832	
Gender ratio					
<1	3	0.45(0.30,0.67)	47.2	<0.001	95.8%
≥1	2	0.69(0.61,0.79)	4.52	<0.001	77.9%
Between groups			4.08	0.043	
Income level					
High income	5	0.51(0.41,0.65)	62.9	<0.001	93.6%
Upper-middle income	2	0.46(0.23,0.93)	654	<0.001	99.8%
Between groups			0.07	0.793	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
NRS2002≥3, ≥18 years	90	0.45(0.35,0.57)	27300	<0.001	99.9%
Gender					
≥18 years					
Female	9	0.48(0.39,0.59)	264	<0.001	97.0%
Male	8	0.53(0.44,0.65)	289	<0.001	97.6%
Between groups			0.53	0.467	
≥65 years					
Female	3	0.21(0.06,0.78)	1720	<0.001	99.9%
Male	3	0.13(0.08,0.20)	59.1	<0.001	96.6%
Between groups			0.48	0.49	
Between groups			33.4	<0.001	
Age					
≥ 65 years	16	0.51(0.35,0.75)	25400	<0.001	99.9%
< 65 years	6	0.21(0.09,0.47)	860	<0.001	99.4%
Between groups			3.79	0.0516	
Region					
Western Pacific	43	0.39(0.31,0.49)	61800	<0.001	99.9%
European	30	0.39(0.29,0.54)	21600	<0.001	99.9%
Americas	8	0.53(0.43,0.67)	243	<0.001	97.1%
Eastern Mediterranean	8	0.53(0.43,0.65)	1090	<0.001	99.4%
South-East Asia	1	0.74(0.68,0.80)	0	—	—
Between groups			44.3	<0.001	
Country					
China	42	0.38(0.30,0.49)	61700	<0.001	99.9%
Turkey	8	0.32(0.13,0.78)	7820	<0.001	99.9%
Iran	6	0.64(0.52,0.78)	829	<0.001	99.4%
Norway	5	0.36(0.24,0.54)	334	<0.001	98.8%
Brazil	5	0.55(0.38,0.79)	189	<0.001	97.9%
Mexico	3	0.51(0.39,0.66)	42	<0.001	95.2%
Portugal	3	0.68(0.48,0.95)	102	<0.001	98.0%
Italy	3	0.53(0.37,0.77)	59.1	<0.001	96.6%
Spain	2	0.40(0.10,1.00)	183	<0.001	99.5%
Germany	2	0.20(0.07,0.56)	22.9	<0.001	95.6%
Switzerland	2	0.39(0.17,0.91)	68.6	<0.001	98.5%
Palestine	1	0.24(0.18,0.32)	0	—	—
Slovenia	1	0.67(0.58,0.76)	0	—	—
Denmark	1	0.65(0.58,0.74)	0	—	—
Vietnam	1	0.63(0.56,0.71)	0	—	—
Finland	1	0.30(0.29,0.32)	0	—	—
Lebanon	1	0.31(0.27,0.37)	0	—	—
Indonesia	1	0.74(0.68,0.80)	0	—	—
Croatia	1	0.40(0.33,0.49)	0	—	—
Between groups			511	<0.001	
Timepoint					
< 24h	26	0.40(0.33,0.48)	2190	<0.001	98.9%
< 48h	16	0.43(0.35,0.53)	1790	<0.001	99.2%
< 72h	5	0.46(0.32,0.66)	761	<0.001	99.5%
Between groups			0.72	69.9%	
Gender ratio (female: male)					
<1	60	0.41(0.33,0.50)	82000	<0.001	99.9%
≥1	17	0.41(0.33,0.50)	843	<0.001	98.1%
Between groups			0	0.971	
Applier					
Dietitian participated	27	0.44(0.31,0.63)	76000	<0.001	100%
Others	21	0.37(0.29,0.47)	4230	<0.001	99.5%
Between groups			0.65	0.419	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
NRS2002≥3, ≥18 years	90	0.45(0.35,0.57)	27300	<0.001	99.9%
Income level					
Upper middle income	65	0.41(0.34,0.51)	119000	<0.001	99.9%
High income	22	0.42(0.35,0.52)	2880	<0.001	99.3%
Lower middle income	3	0.36(0.20,0.65)	67.5	<0.001	97.0%
Between groups			0.25	0.883	
MNA-SF≤11, ≥60 years	30	0.62(0.57,0.67)	4460	<0.001	99.3%
Severity					
8≤ MNA-SF ≤11, at risk of malnutrition	17	0.40(0.34,0.47)	325	<0.001	95.1%
MNA-SF≤7, malnourished	19	0.23(0.17,0.31)	1180	<0.001	98.5%
Between groups			9.81	0.002	
Region					
European	13	0.62(0.54,0.72)	600	<0.001	98.0%
WesternPacific	11	0.64(0.53,0.78)	3170	<0.001	99.7%
EasternMediterranean	2	0.65(0.49,0.87)	11.7	<0.001	91.5%
Americas	2	0.42(0.28,0.62)	8.89	0.003	88.8%
South-EastAsia	2	0.60(0.54,0.66)	0.33	0.566	0
Between groups			4.25	0.373	
Country					
Spain	4	0.73(0.58,0.91)	199	<0.001	98.5%
Japan	4	0.54(0.40,0.71)	98.5	<0.001	97.0%
China	4	0.70(0.49,1.00)	2660	<0.001	99.9%
Turkey	3	0.56(0.33,0.96)	86.3	<0.001	97.7%
Brazil	2	0.42(0.28,0.62)	8.89	0.003	88.8%
Germany	2	0.55(0.24,1.00)	40.3	<0.001	97.5%
Poland	2	0.46(0.22,0.95)	24.8	<0.001	96.0%
India	2	0.60(0.54,0.66)	0.33	0.566	0.00%
Vietnam	2	0.72(0.69,0.74)	0.03	0.862	0.00%
Egypt	1	0.56(0.49,0.63)	—	—	—
Denmark	1	0.69(0.60,0.78)	—	—	—
Slovenia	1	0.82(0.75,0.90)	—	—	—
SaudiArabia	1	0.75(0.67,0.84)	—	—	—
Malaysia	1	0.76(0.66,0.86)	—	—	—
Between groups			51.6	<0.001	
Timepoint					
< 24h	8	0.68(0.53,0.87)	2810	<0.001	99.8%
< 48h	5	0.62(0.54,0.72)	30.9	<0.001	87.0%
< 72h	2	0.82(0.55,1.00)	85.9	<0.001	98.8%
Between groups			1.75	0.417	
Gender ratio (female: male)					
≥1	12	0.68(0.62,0.76)	168	<0.001	93.5%
<1	9	0.57(0.47,0.70)	998	<0.001	99.2%
Between groups			2.42	0.12	
Applier					
Others	4	0.78(0.69,0.87)	26.1	<0.001	88.5%
Dietitian participated	2	0.61(0.45,0.84)	44.8	<0.001	97.8%
Between groups			2.02	0.156	
Income level					
High income	15	0.61(0.52,0.71)	998	<0.001	98.6%
Upper middle income	10	0.60(0.48,0.75)	2920	<0.001	99.7%
Lower middle income	5	0.64(0.57,0.71)	23.6	<0.001	83.0%
Between group			0.38	0.826	
Stamp ≥2, 1-17 years	6	0.55(0.44,0.68)	327	<0.001	98.5%

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
GLIM, ≥18 years	80	0.39(0.35,0.44)	19300	<0.001	99.6%
Region					
Western Pacific	48	0.36(0.31,0.42)	14600	<0.001	99.7%
European	23	0.48(0.41,0.55)	1200	<0.001	98.2%
Eastern Mediterranean	4	0.33(0.22,0.49)	101	<0.001	97.0%
Americas	3	0.42(0.35,0.50)	11.1	0.004	82.0%
South-East Asia	2	0.51(0.42,0.62)	3.22	0.073	68.9%
Between groups			11.8	0.019	
Country					
China	34	0.34(0.29,0.40)	11300	<0.001	99.7%
Japan	7	0.42(0.24,0.73)	1710	<0.001	99.6%
Spain	7	0.61(0.53,0.70)	112	<0.001	94.6%
Denmark	5	0.55(0.48,0.63)	11.4	0.022	64.8%
Brazil	4	0.33(0.22,0.49)	101	<0.001	97.0%
Germany	2	0.41(0.25,0.65)	14.8	<0.001	93.2%
Australia	2	0.32(0.26,0.39)	2.09	0.148	52.2%
Iran	2	0.45(0.39,0.53)	3.04	0.081	67.1%
Italy	2	0.37(0.08,1.00)	47	<0.001	97.9%
Mexico	2	0.43(0.40,0.46)	2.01	0.156	50.3%
India	2	0.51(0.42,0.62)	3.22	0.073	68.9%
Korea	1	0.33(0.27,0.40)	0	—	—
Malaysia	1	0.51(0.35,0.66)	0	—	—
Norway	3	0.33(0.30,0.38)	6.69	0.035	70.1%
Poland	1	0.23(0.16,0.31)	0	—	—
Portugal	1	0.77(0.66,0.85)	0	—	—
Switzerland	1	0.36(0.32,0.40)	0	—	—
Turkey	1	0.36(0.30,0.43)	0	—	—
UK	1	0.75(0.67,0.83)	0	—	—
Vietnam	1	0.63(0.56,0.71)	0	—	—
Between groups			263	<0.001	
Timepoint					
<24h	22	0.40(0.33,0.48)	2270	<0.001	99.1%
<48h	15	0.42(0.33,0.53)	1220	<0.001	98.9%
<72h	8	0.38(0.33,0.44)	83.4	<0.001	91.6%
Between groups			0.4	0.821	
Gender ratio (female: male)					
<1	52	0.36(0.31,0.42)	14600	<0.001	99.7%
≥1	16	0.47(0.40,0.56)	370	<0.001	95.9%
Between groups			5.47	1.90%	
Applier					
Dietitian participated	20	0.43(0.32,0.58)	10100	<0.001	99.8%
Others	8	0.33(0.26,0.40)	124	<0.001	94.4%
Between groups			2.32	0.128	
Income level*					
Upper middle income	45	0.35(0.31,0.41)	12000	<0.001	99.6%
High income	31	0.44(0.37,0.52)	2970	<0.001	99.0%
Lower middle income	4	0.49(0.38,0.64)	39.2	<0.001	92.3%
Between groups			6.64	0.036	
One step GLIM, ≥18 years	44	0.42(0.37,0.48)	4860	<0.001	99.1%
Gender					
Male	4	0.54(0.43,0.69)	36.4	<0.001	91.8%
Female	3	0.56(0.50,0.62)	2.95	0.23	32.2%
Between groups			0.04	0.835	
Severity					
≥18 years					
Moderate	16	0.24(0.16,0.36)	3160	<0.001	99.5%
Severe	17	0.19(0.13,0.28)	2010	<0.001	99.2%
Between groups			0.61	0.434	

*$p<0.05$, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity-, not applicable; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
One step GLIM, ≥18 years	44	0.42(0.37,0.48)	4860	<0.001	99.1%
≥ 60 years					
Moderate	3	0.19(0.10,0.39)	43.2	<0.001	95.4%
Severe	3	0.30(0.18,0.50)	43	<0.001	95.3%
Between groups			0.92	0.337	
Between groups			2.07	0.559	
Region					
Western Pacific	22	0.38(0.32,0.46)	2940	<0.001	99.3%
European	15	0.48(0.39,0.58)	1110	<0.001	98.7%
Americas	3	0.38(0.25,0.58)	57.6	<0.001	96.5%
Eastern Mediterranean	2	0.42(0.31,0.57)	11	0.001	90.9%
South-East Asia	2	0.51(0.42,0.62)	3.22	0.07	68.9%
Between groups			5.3	0.258	
Country					
China	12	0.38(0.31,0.47)	1290	<0.001	99.1%
Spain	5	0.62(0.51,0.74)	106	<0.001	96.2%
Japan	4	0.35(0.14,0.91)	1450	<0.001	99.8%
Brazil	3	0.38(0.25,0.58)	57.6	<0.001	96.5%
Norway	3	0.33(0.30,0.38)	6.69	0.04	70.1%
Germany	2	0.41(0.25,0.65)	14.8	0.001	93.2%
Australia	2	0.32(0.26,0.39)	2.09	0.15	52.2%
Italy	2	0.37(0.08,1.00)	47	<0.001	97.9%
India	2	0.51(0.42,0.62)	3.22	0.07	68.9%
Denmark	1	0.62(0.52,0.75)	0	—	—
Mexico	1	0.44(0.41,0.48)	0	—	—
Malaysia	1	0.50(0.38,0.66)	0	—	—
Turkey	1	0.36(0.30,0.42)	0	—	—
UK	1	0.75(0.67,0.83)	0	—	—
Iran	1	0.49(0.43,0.55)	0	—	—
Korea	1	0.33(0.27,0.40)	0	—	—
Vietnam	1	0.63(0.55,0.71)	0	—	—
Lebanon	1	0.36(0.31,0.41)	0	—	—
Between groups			211	<0.001	
Timepoint					
< 24h	12	0.45(0.33,0.63)	1520	<0.001	99.3%
< 48h	8	0.43(0.28,0.64)	811	<0.001	99.1%
< 72h	5	0.36(0.29,0.44)	63.3	0.001	93.7%
Between groups			1.76	0.415	
Gender ratio (female: male)					
<1	29	0.41(0.36,0.47)	3020	<0.001	99.1%
≥1	11	0.43(0.35,0.55)	261	<0.001	96.2%
Between groups			0.17	0.68	
Applier					
Dietitian participated	10	0.43(0.33,0.57)	1200	<0.001	99.2%
Others	3	0.37(0.26,0.52)	38.9	<0.001	94.9%
Between groups			0.53	0.466	
Income level					
Upper middle income	20	0.40(0.34,0.47)	1460	<0.001	98.7%
High income	20	0.42(0.34,0.53)	2680	<0.001	99.3%
Lower middle income	4	0.49(0.38,0.64)	39.2	<0.001	92.3%
Between groups			1.73	0.422	
Two step GLIM, NRS2002 – GLIM, ≥18 years	18	0.34(0.26,0.46)	5320	<0.001	99.7%
Region					
Western Pacific	15	0.33(0.24,0.45)	5130	<0.001	99.7%
European	2	0.41(0.31,0.53)	6.12	0.047	83.7%
Eastern Mediterranean	1	0.41(0.36,0.48)	0	—	—
Between groups			1.72	0.424	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 7. Subgroup analyses of pooled prevalence of nutritional risk or malnutrition among hospitalized patients at admission (cont.)

Subgroup	Number of studies included	Prevalence with 95% CI	Cochran's Q statistics for heterogeneity	*p* value	I^2
Two step GLIM, NRS2002 – GLIM, ≥18 years	18	0.34(0.26,0.46)	5320	<0.001	99.7%
Region					
Western Pacific	15	0.33(0.24,0.45)	5130	<0.001	99.7%
European	2	0.41(0.31,0.53)	6.12	0.047	83.7%
Eastern Mediterranean	1	0.41(0.36,0.48)	0	—	—
Between groups			1.72	0.424	
Country					
China	14	0.32(0.23,0.45)	4900	<0.001	99.7%
Mexico	1	0.41(0.38,0.44)	0	—	—
Iran	1	0.41(0.36,0.48)	0	—	—
Switzerland	1	0.36(0.32,0.40)	0	—	—
Denmark	1	0.47(0.39,0.57)	0	—	—
Between groups			9.03	0.06	
Timepoint					
< 24h	6	0.32(0.26,0.40)	196	<0.001	97.4%
< 48h	4	0.37(0.24,0.57)	237	<0.001	98.7%
< 72h	2	0.39(0.34,0.44)	3.96	0.047	74.7%
Between groups			1.82	0.402	
Gender ratio (female: male)					
<1	13	0.32(0.23,0.45)	3520	<0.001	99.7%
≥1	1	0.47(0.39,0.57)	0	—	—
Between groups			3.59	0.058	
Applier					
Dietitian participated	6	0.37(0.20,0.67)	2690	<0.001	99.8%
Others	4	0.29(0.21,0.40)	69.9	<0.001	95.7%
Between groups			0.47	0.493	
Income level					
Upper-middle income	16	0.33(0.25,0.45)	5200	<0.001	99.7%
High income	2	0.41(0.31,0.53)	6.12	0.013	83.7%
Between groups			0.86	0.353	
Two step GLIM, MNA-SF – GLIM, ≥60 years	7	0.49(0.35,0.68)	860	<0.001	99.3%
Region					
Western Pacific	4	0.57(0.36,0.88)	837	<0.001	99.6%
European	3	0.40(0.27,0.59)	22.3	<0.001	91.0%
Between groups			1.33	0.249	
Country					
China	2	0.46(0.23,0.93)	654	<0.001	99.8%
Japan	2	0.69(0.61,0.79)	4.52	0.034	77.9%
Spain	1	0.54(0.46,0.62)	0	—	—
Denmark	1	0.48(0.39,0.58)	0	—	—
Poland	1	0.23(0.17,0.32)	0	—	—
Between groups			42.9	<0.001	
Timepoint					
< 24h	2	0.53(0.22,1.00)	262	<0.001	99.6%
< 72h	1	0.54(0.46,0.62)	—	—	—
Between groups			0.04	0.832	
Gender ratio*					
<1	3	0.45(0.30,0.67)	47.2	<0.001	95.8%
≥1	2	0.69(0.61,0.79)	4.52	<0.001	77.9%
Between groups			4.08	0.043	
Income level					
High income	5	0.51(0.41,0.65)	62.9	<0.001	93.6%
Upper-middle income	2	0.46(0.23,0.93)	654	<0.001	99.8%
Between groups			0.07	0.793	

*p<0.05, statistically significant; CI, confidence interval; I^2, inconsistency index for heterogeneity; -, not applicable.

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
NRS2002 ≥ 3, ≥ 18 years						
Region	0.32	0.594	99.9	11.9	299	320
Country	0.559	0.503	99.9	25.3	308	370
Timepoint	0.85	0.512	99.9	24.1	298	325
Gender ratio	0.705	0.669	99.9	0.79	305	317
Applier group	0.766	0.748	99.9	0	313	325
Income	0.924	0.684	99.9	0	307	319
Mean age group	0.115	0.478	99.9	29.1	287	311
Q1	0.754	0.629	99.9	6.78	300	309
Q2*	0.0409	0.309	99.8	54.2	281	290
Q3	0.75	0.4	99.9	40.6	283	292
Q4*	0.0341	0.674	99.9	0	300	309
Q5	0.201	0.673	99.9	0.11	302	311
Q6	0.189	0.672	99.9	0.39	302	311
Q9	0.635	0.718	99.9	0	308	317
Q10	0.605	0.659	99.9	2.28	302	311
Q11	0.258	0.39	99.9	42.1	282	294
W1	0.975	0.464	99.9	31.2	286	295
W2	0.0882	0.492	99.9	27.1	285	294
W3	0.264	0.683	99.9	0	304	313
W4*	0.0316	0.627	99.9	7.07	295	304
W5	0.806	0.675	99.9	0	304	313
W6	0.336	0.478	99.9	29.1	286	295
W7	0.164	0.625	99.9	7.37	297	306
W8*	0.0241	0.548	99.9	18.7	288	297
W9	0.631	0.675	99.9	0	304	313
W10	0.948	0.675	99.9	0	304	313
W12	0.511	0.593	99.9	12	302	329
Q2+Q4#	0.008	0.304	99.8	54.5	137	147
Q2+W4	0.119	0.311	99.8	53.5	143	153
Q2+W8	0.18	0.314	99.8	53	144	154
Q4+W4	0.141	0.664	99.9	0.64	170	180
Q4+W8	0.157	0.637	99.9	4.69	168	178
W4+W8	0.465	0.638	99.9	4.53	171	181
Q2+Q4+W4	0.009	0.31	99.8	53.7	137	150
Q2+Q4+W8	0.014	0.313	99.8	53.3	139	151
Q2+W4+W8	0.146	0.319	99.8	52.3	144	157
Q4+W4+W8	0.188	0.638	99.9	4.61	169	182
Q2+Q4+W4+W8	0.012	0.318	99.8	52.5	139	154
MNA-SF ≤ 11, ≥60 years						
Region	0.533	0.0988	99.3	0	22.5	30.9
Country	0.85	0.117	99.5	0	36.7	57.8
Timepoint	0.324	0.105	99.2	0	21.3	29.7
Gender ratio	0.372	0.115	99.3	0	20.6	26.2
Applier group	0.0868	0.0499	99.3	1.53	20.1	25.7
Income	0.953	0.11	99.3	0	22.1	27.7
Mean age group	0.0073	0.0172	97.9	66	54.9	61.9
Q1	0.803	0.0255	98.6	49.7	42.1	46.3
Q2*	0.03	0.0425	99.2	16.1	21.2	25.4
Q3*	0.0026	0.0471	99.3	6.91	14.8	19.1
Q4*	0.103	0.0493	99.4	2.56	20.5	24.7
Q5	0.413	0.0481	99.3	4.98	22.9	27.1
Q6	—	—	—	—	—	—
Q7	—	—	—	—	—	—
Q8	0.749	0.0504	99.4	0.43	22.7	26.9
Q9	0.0089	0.0466	99.3	8.03	17.3	21.5
Q10	—	—	—	—	—	—
Q11*	0.0068	0.0452	99.3	10.7	16.7	22.3
W1*	0.0228	0.0458	99.3	9.5	19.2	23.4
W2	0.977	0.0503	99.4	0.72	22.9	27.1
W3*	0.0207	0.0479	99.3	5.46	18.3	22.5

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
MNA-SF ≤ 11, ≥60 years						
W4	0.193	0.028	98.8	44.7	36.6	40.8
W5	—	—	—	—	—	—
W6*	0.0027	0.0182	98	64.1	50.7	54.9
W7	0.816	0.111	99.4	0	20.2	24.4
W8	0.37	0.111	99.4	0	19.5	23.7
W9	—	—	—	—	—	—
W10	—	—	—	—	—	—
W11	—	—	—	—	—	—
W12	0.438	0.119	99.4	0	23.9	33.7
meanagegroup+Q2	0.0004	0.0176	98	65.2	47.1	55.5
meanagegroup+Q3	<.0001	0.0163	97.9	67.7	38.8	47.2
meanagegroup+Q9	<.0001	0.0176	98	65.3	40.8	49.2
meanagegroup+Q11#	<.0001	0.0112	97	78	48.4	58.2
meanagegroup+W1	<.0001	0.0168	97.9	66.8	44.9	53.3
meanagegroup+W3	0.0002	0.0161	97.8	68.3	51.4	59.8
meanagegroup+W6	<.0001	0.0132	97.3	74	62.6	71.0
Q2+Q3	0.003	0.0434	99.2	14.3	15.8	21.4
Q2+Q9	0.0064	0.0425	99.2	16.2	17.8	23.4
Q2+Q11	0.0121	0.0426	99.2	15.9	18.9	25.9
Q2+W1	0.0253	0.0426	99.2	15.8	20.5	26.1
Q2+W3	0.0129	0.0418	99.2	17.4	19.5	25.1
Q2+W6	0.0028	0.018	98	64.5	50.5	56.1
Q3+Q9	0.0023	0.0441	99.2	12.9	15	20.6
Q3+Q11	0.0071	0.0459	99.3	9.39	16.3	23.3
Q3+W1	0.0036	0.0442	99.2	12.8	15.9	21.5
Q3+W3	0.0038	0.0454	99.3	10.4	16.2	22.2
Q3+W6	<.0001	0.0183	98	63.8	40.6	46.3
Q9+Q11	0.0187	0.046	99.3	9.16	18.4	25.4
Q9+W1	0.0152	0.0455	99.3	10.1	18.2	23.8
Q9+W3	0.0029	0.0444	99.3	12.3	15.3	20.9
Q9+W6	0.0001	0.0182	98	64.1	43.4	49.0
Q11+W1	0.0109	0.0448	99.3	11.5	17.7	24.7
Q11+W3	0.0043	0.0436	99.3	13.9	16.2	22.7
Q11+W6	<.0001	0.0147	97.6	70.9	54.2	61.2
W1+W3	0.0138	0.0454	99.3	10.4	18	23.6
W1+W6	0.0008	0.0186	98.1	63.2	45.9	51.5
W3+W6	0.0004	0.018	98.1	64.4	46.5	52.1
meanagegroup+Q2+Q3	<.0001	0.0167	98	67	36.2	46.0
meanagegroup+Q2+Q9	<.0001	0.0176	98	65.2	38.1	48.0
meanagegroup+Q2+Q11	<.0001	0.0113	97.1	77.8	48.2	59.4
meanagegroup+Q2+W1	<.0001	0.017	98	66.4	43.6	53.4
meanagegroup+Q2+W3	<.0001	0.0165	97.9	67.4	46.7	56.5
meanagegroup+Q2+W6	<.0001	0.013	97.3	74.3	62.5	72.3
meanagegroup+Q3+Q9	<.0001	0.0162	97.9	68	35.4	45.2
meanagegroup+Q3+Q11	<.0001	0.0111	97	78	45.7	56.9
meanagegroup+Q3+W1	<.0001	0.0163	97.9	67.9	36.1	45.9
meanagegroup+Q3+W3	<.0001	0.015	97.8	70.3	41.9	51.8
meanagegroup+Q3+W6	<.0001	0.0133	97.4	73.8	48.8	58.6
meanagegroup+Q9+Q11	<.0001	0.0096	96.5	81.1	58.9	70.1
meanagegroup+Q9+W1	<.0001	0.016	97.8	68.4	43.1	52.9
meanagegroup+Q9+W3	<.0001	0.0163	97.9	67.9	38.9	48.7
meanagegroup+Q9+W6	<.0001	0.0135	97.4	73.3	49.8	59.6
meanagegroup+Q11+W1	<.0001	0.011	97	78.3	48.9	60.1
meanagegroup+Q11+W3	<.0001	0.0112	97.1	77.9	48.3	59.6
meanagegroup+Q11+W6	<.0001	0.0071	95.3	85.9	71.5	82.8
meanagegroup+W1+W3	<.0001	0.0162	97.9	68	44.7	54.5
meanagegroup+W1+W6	<.0001	0.0136	97.4	73.2	54.7	64.5
meanagegroup+W3+W6	<.0001	0.0125	97.3	75.3	61.9	71.7
Q2+Q3+Q9	0.003	0.0429	99.2	15.2	15.7	22.7
Q2+Q3+Q11	0.0105	0.0434	99.3	14.4	18.3	26.7
Q2+Q3+W1	0.0059	0.0432	99.2	14.8	17.1	24.1

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
MNA-SF ≤ 11, ≥60 years						
Q2+Q3+W3	0.0043	0.0427	99.2	15.7	16.6	23.6
Q2+Q3+W6	<.0001	0.0184	98.1	63.7	40.3	47.3
Q2+Q9+Q11	0.0247	0.0432	99.3	14.8	20.4	28.8
Q2+Q9+W1	0.015	0.0431	99.2	14.9	19.1	25.8
Q2+Q9+W3	0.0033	0.0418	99.2	17.6	16.6	23.7
Q2+Q9+W6	0.0001	0.017	97.9	66.5	47.3	54.3
Q2+Q11+W1	0.0197	0.0431	99.3	15.0	19.9	28.3
Q2+Q11+W3	0.0082	0.0422	99.3	16.8	18.4	26.8
Q2+Q11+W6	<.0001	0.015	97.7	70.4	54.7	63.1
Q2+W1+W3	0.0165	0.0424	99.2	16.4	19.7	26.7
Q2+W1+W6	0.0012	0.0187	98.1	63.1	47.3	54.3
Q2+W3+W6	0.0004	0.018	98.1	64.5	47.6	54.6
Q3+Q9+Q11	0.0138	0.0455	99.3	10.1	18.0	26.4
Q3+Q9+W1	0.0052	0.0439	99.2	13.3	16.5	23.5
Q3+Q9+W3	0.0022	0.0427	99.2	15.7	15.2	22.2
Q3+Q9+W6	<.0001	0.0184	98.1	63.7	44.1	51.1
Q3+Q11+W1	0.0109	0.0448	99.3	11.4	17.7	26.1
Q3+Q11+W3	0.0068	0.0444	99.3	12.3	16.9	25.3
Q3+Q11+W6	<.0001	0.0151	97.7	70.1	50.1	58.5
Q3+W1+W3	0.0054	0.0439	99.3	13.3	16.6	23.6
Q3+W1+W6	<.0001	0.0188	98.1	62.9	39.0	46.0
Q3+W3+W6	<.0001	0.0181	98.1	64.2	39.9	46.9
Q9+Q11+W1	0.027	0.046	99.3	9.17	19.4	27.8
Q9+Q11+W3	0.0094	0.0443	99.3	12.5	17.6	25.6
Q9+Q11+W6	<.0001	0.0136	97.4	73.2	60.4	68.8
Q9+W1+W3	0.007	0.0446	99.3	12.0	16.8	23.8
Q9+W1+W6	0.0002	0.0182	98.1	64.0	44.0	51.0
Q9+W3+W6	<.0001	0.0181	98.1	64.3	44.1	51.1
Q11+W1+W3	0.0083	0.044	99.3	13.1	17.5	25.9
Q11+W1+W6	<.0001	0.0153	97.8	70.3	52.8	61.2
Q11+W3+W6	<.0001	0.0148	97.8	70.7	49.9	58.3
W1+W3+W6	0.0002	0.0183	98.1	63.8	43.9	50.9
meanagegroup+Q2+Q3+Q9	<.0001	0.0165	97.9	67.5	34.2	45.4
meanagegroup+Q2+Q3+Q11	<.0001	0.0112	97.2	77.8	45.6	58.2
meanagegroup+Q2+Q3+W1	<.0001	0.0161	97.9	68.1	36.8	48.0
meanagegroup+Q2+Q3+W3	<.0001	0.0152	97.8	69.9	40.5	51.7
meanagegroup+Q2+Q3+W6	<.0001	0.0129	97.4	74.4	49.9	61.7
meanagegroup+Q2+Q9+Q11	<.0001	0.0097	96.6	80.9	58.3	70.9
meanagegroup+Q2+Q9+W1	<.0001	0.016	97.8	68.4	43.1	54.3
meanagegroup+Q2+Q9+W3	<.0001	0.0164	97.9	67.6	38.9	50.1
meanagegroup+Q2+Q9+W6	<.0001	0.0132	97.4	73.8	51.6	63.4
meanagegroup+Q2+Q11+W1	<.0001	0.0111	97.1	78.1	48.9	61.5
meanagegroup+Q2+Q11+W3	<.0001	0.0113	97.3	77.6	48.3	61.0
meanagegroup+Q2+Q11+W6	<.0001	0.0073	95.7	85.8	72.8	85.4
meanagegroup+Q2+W1+W3	<.0001	0.0162	97.9	68.0	44.7	55.9
meanagegroup+Q2+W1+W6	<.0001	0.0136	97.4	73.2	54.7	65.9
meanagegroup+Q2+W3+W6	<.0001	0.0122	97.2	76.0	63.5	74.7
meanagegroup+Q3+Q9+Q11	<.0001	0.0097	96.6	80.9	55.1	67.7
meanagegroup+Q3+Q9+W1	<.0001	0.0149	97.7	70.5	38.9	51.1
meanagegroup+Q3+Q9+W3	<.0001	0.0146	97.7	71.2	38.8	50.0
meanagegroup+Q3+Q9+W6	<.0001	0.0135	97.5	73.4	44.1	56.3
meanagegroup+Q3+Q11+W1	<.0001	0.0109	97.1	78.5	47.2	59.8
meanagegroup+Q3+Q11+W3	<.0001	0.0111	97.1	78	46.9	59.5
meanagegroup+Q3+Q11+W6	<.0001	0.0072	95.5	85.8	69.1	81.7
meanagegroup+Q3+W1+W3	<.0001	0.0153	97.9	69.7	39.2	51.4
meanagegroup+Q3+W1+W6	<.0001	0.0137	97.5	73.0	45.1	57.3
meanagegroup+Q3+W3+W6	<.0001	0.0125	97.4	75.3	51.5	63.7
meanagegroup+Q9+Q11+W1	<.0001	0.0088	96.4	82.8	63.6	77.6
meanagegroup+Q9+Q11+W3	<.0001	0.0095	96.7	81.2	59.4	73.5
meanagegroup+Q9+Q11+W6	<.0001	0.0072	95.5	85.7	72.5	86.5
meanagegroup+Q9+W1+W3	<.0001	0.0157	97.8	69.1	41.1	53.3

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
MNA-SF ≤ 11, ≥60 years						
meanagegroup+Q9+W1+W6	<.0001	0.0136	97.5	73.1	49.7	61.9
meanagegroup+Q9+W3+W6	<.0001	0.0127	97.3	74.9	46.9	59.1
meanagegroup+Q11+W1+W3	<.0001	0.0111	97.1	78.2	49.4	62.0
meanagegroup+Q11+W1+W6	<.0001	0.0073	95.5	85.7	71.3	84.9
meanagegroup+Q11+W3+W6	<.0001	0.0072	95.5	85.7	72.1	85.7
meanagegroup+W1+W3+W6	<.0001	0.0128	97.4	74.8	56.7	68.9
Q2+Q3+Q9+Q11	0.0152	0.0428	99.3	15.4	19.7	29.5
Q2+Q3+Q9+W1	0.0074	0.0434	99.2	14.3	17.5	27.3
Q2+Q3+Q9+W3	0.0033	0.0422	99.2	16.7	16.3	26.1
Q2+Q3+Q9+W6	<.0001	0.0174	98.0	65.6	41.2	51.0
Q2+Q3+Q11+W1	0.0177	0.0434	99.3	14.3	19.8	31.2
Q2+Q3+Q11+W3	0.0113	0.043	99.3	15.1	18.9	30.3
Q2+Q3+Q11+W6	<.0001	0.0154	97.8	69.5	50.2	61.0
Q2+Q3+W1+W3	0.0083	0.0429	99.3	15.3	18.0	27.8
Q2+Q3+W1+W6	<.0001	0.0187	98.1	63.1	39.8	49.6
Q2+Q3+W3+W6	<.0001	0.018	98.1	64.5	40.3	50.1
Q2+Q9+Q11+W1	0.0402	0.0439	99.3	13.3	21.6	33.5
Q2+Q9+Q11+W3	0.0143	0.0427	99.3	15.7	19.6	31.4
Q2+Q9+Q11+W6	0.0001	0.0137	97.5	73.0	60.6	72.4
Q2+Q9+W1+W3	0.0085	0.0425	99.2	16.0	18.2	28.0
Q2+Q9+W1+W6	0.0003	0.0173	97.9	65.9	47.4	57.2
Q2+Q9+W3+W6	<.0001	0.0165	97.9	67.5	44.7	55.5
Q2+Q11+W1+W3	0.0151	0.0428	99.3	15.4	19.7	31.5
Q2+Q11+W1+W6	<.0001	0.0153	97.8	69.8	53.6	65.4
Q2+Q11+W3+W6	<.0001	0.0151	97.8	70.2	50.8	62.6
Q2+W1+W3+W6	0.0004	0.018	98.1	64.5	45.6	56.4
Q3+Q9+Q11+W1	0.0219	0.0452	99.3	10.7	19.5	31.1
Q3+Q9+Q11+W3	0.0111	0.0441	99.3	12.9	18.3	30.0
Q3+Q9+Q11+W6	<.0001	0.0134	97.4	73.5	57.8	69.6
Q3+Q9+W1+W3	0.0053	0.0432	99.3	14.7	16.8	26.6
Q3+Q9+W1+W6	<.0001	0.0184	98.1	63.6	39.6	49.4
Q3+Q9+W3+W6	<.0001	0.0182	98.1	64.0	40.2	50.0
Q3+Q11+W1+W3	0.0118	0.0443	99.3	12.5	18.4	30.2
Q3+Q11+W1+W6	<.0001	0.0154	97.8	69.6	49.4	61.3
Q3+Q11+W3+W6	<.0001	0.0153	97.8	69.9	47.7	59.5
Q3+W1+W3+W6	0.0004	0.0184	98.1	63.6	39.3	49.1
Q9+Q11+W1+W3	0.0176	0.0449	99.3	11.3	19.1	31.1
Q9+Q11+W1+W6	<.0001	0.0133	97.4	73.6	61.3	73.1
Q9+Q11+W3+W6	<.0001	0.0135	97.5	73.0	55.5	67.3
Q9+W1+W3+W6	0.0002	0.0177	98.1	65.1	42.1	52.9
Q11+W1+W3+W6	<.0001	0.0151	97.8	70.2	49.5	61.3
meanagegroup+Q2+Q3+Q9+Q11	<.0001	0.0098	96.8	80.7	54.3	68.3
meanagegroup+Q2+Q3+Q9+W1	<.0001	0.0151	97.8	70.3	39.0	51.6
meanagegroup+Q2+Q3+Q9+W3	<.0001	0.0149	97.8	70.7	38.2	50.8
meanagegroup+Q2+Q3+Q9+W6	<.0001	0.0132	97.5	74.0	45.8	58.4
meanagegroup+Q2+Q3+Q11+W1	<.0001	0.011	97.1	78.2	47.6	61.6
meanagegroup+Q2+Q3+Q11+W3	<.0001	0.0113	97.2	77.8	47.1	61.1
meanagegroup+Q2+Q3+Q11+W6	<.0001	0.0073	95.7	85.6	69.8	83.8
meanagegroup+Q2+Q3+W1+W3	<.0001	0.0153	97.9	69.9	40.1	52.7
meanagegroup+Q2+Q3+W1+W6	<.0001	0.0129	97.4	74.5	48.6	61.2
meanagegroup+Q2+Q3+W3+W6	<.0001	0.0119	97.2	76.6	54.5	67.1
meanagegroup+Q2+Q9+Q11+W1	<.0001	0.0088	96.4	82.6	63.7	77.7
meanagegroup+Q2+Q9+Q11+W3	<.0001	0.0096	96.7	81.0	59.3	73.3
meanagegroup+Q2+Q9+Q11+W6	<.0001	0.0073	95.7	85.5	73.4	87.4
meanagegroup+Q2+Q9+W1+W3	<.0001	0.0159	97.9	68.6	40.7	53.3
meanagegroup+Q2+Q9+W1+W6	<.0001	0.0132	97.5	73.9	52.4	65.0
meanagegroup+Q2+Q9+W3+W6	<.0001	0.0124	97.3	75.6	49.7	62.3
meanagegroup+Q2+Q11+W1+W3	<.0001	0.0112	97.3	77.9	50.2	64.3
meanagegroup+Q2+Q11+W1+W6	<.0001	0.0073	95.7	85.6	72.8	86.8
meanagegroup+Q2+Q11+W3+W6	<.0001	0.0073	95.7	85.6	73.3	87.3
meanagegroup+Q2+W1+W3+W6	<.0001	0.0123	97.3	75.6	59.5	72.1

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
MNA-SF ≤ 11, ≥60 years						
meanagegroup+Q3+Q9+Q11+W1	<.0001	0.0088	96.4	82.6	60.2	74.2
meanagegroup+Q3+Q9+Q11+W3	<.0001	0.0096	96.7	81.1	56.7	70.7
meanagegroup+Q3+Q9+Q11+W6	<.0001	0.0073	95.7	85.5	69.9	83.9
meanagegroup+Q3+Q9+W1+W3	<.0001	0.0143	97.7	71.8	40.8	53.4
meanagegroup+Q3+Q9+W1+W6	<.0001	0.0135	97.6	73.4	44.7	57.3
meanagegroup+Q3+Q9+W3+W6	<.0001	0.0125	97.4	75.3	46.9	59.6
meanagegroup+Q3+Q11+W1+W3	<.0001	0.011	97.2	78.3	48.4	62.4
meanagegroup+Q3+Q11+W1+W6	<.0001	0.0073	95.7	85.5	69.0	83.1
meanagegroup+Q3+Q11+W3+W6	<.0001	0.0073	95.7	85.6	70.0	84
meanagegroup+Q3+W1+W3+W6	<.0001	0.0127	97.4	74.9	49.2	61.8
meanagegroup+Q9+Q11+W1+W3	<.0001	0.0088	96.4	82.6	63.6	77.6
meanagegroup+Q9+Q11+W1+W6	<.0001	0.0073	95.7	85.6	73.0	87.0
meanagegroup+Q9+Q11+W3+W6	<.0001	0.0073	95.7	85.6	73.1	87.1
meanagegroup+Q9+W1+W3+W6	<.0001	0.013	97.5	74.4	50.2	62.8
meanagegroup+Q11+W1+W3+W6	<.0001	0.0073	95.7	85.6	72.4	86.4
Q2+Q3+Q9+Q11+W1	0.0281	0.0432	99.3	14.7	21.8	34.4
Q2+Q3+Q9+Q11+W3	0.0144	0.0425	99.3	16	20	32.6
Q2+Q3+Q9+Q11+W6	<.0001	0.0137	97.5	73.0	57.4	69.2
Q2+Q3+Q9+W1+W3	0.008	0.0434	99.2	14.3	18.1	29.9
Q2+Q3+Q9+W1+W6	<.0001	0.0187	98.1	63.1	42.1	52.9
Q2+Q3+Q9+W3+W6	<.0001	0.0169	98.0	66.6	41.0	51.9
Q2+Q3+Q11+W1+W3	0.0196	0.0433	99.3	14.5	20.4	32.2
Q2+Q3+Q11+W1+W6	<.0001	0.0157	97.9	69.1	50.0	61.8
Q2+Q3+Q11+W3+W6	<.0001	0.0155	97.9	69.4	48.3	60.1
Q2+Q3+W1+W3+W6	0.0004	0.0183	98.1	63.8	40.3	51.1
Q2+Q9+Q11+W1+W3	0.0269	0.0435	99.3	14.1	21.2	33.8
Q2+Q9+Q11+W1+W6	0.0001	0.0136	97.5	73.1	62.1	73.9
Q2+Q9+Q11+W3+W6	<.0001	0.0139	97.6	72.5	56.1	67.9
Q2+Q9+W1+W3+W6	<.0001	0.0165	97.9	67.5	46.3	58.2
Q2+Q11+W1+W3+W6	<.0001	0.0154	97.9	69.6	50.6	62.4
Q3+Q9+Q11+W1+W3	0.0201	0.0445	99.3	12.1	19.9	31.7
Q3+Q9+Q11+W1+W6	<.0001	0.0133	97.5	73.8	59.1	70.9
Q3+Q9+Q11+W3+W6	<.0001	0.0135	97.5	73.3	54.8	66.6
Q3+Q9+W1+W3+W6	<.0001	0.0177	98.1	65.0	39.9	50.8
Q3+Q11+W1+W3+W6	<.0001	0.0154	97.9	69.5	47.8	59.7
Q9+Q11+W1+W3+W6	<.0001	0.0133	97.5	73.8	58.3	70.1
GLIM, ≥ 18 years						
region	0.230	0.252	99.5	13.4	103	117
country	0.585	0.239	99.6	17.9	120	170
timepoint	0.888	0.313	99.6	0	115	131
gender ratio	0.177	0.273	99.6	6.29	103	112
applier group	0.490	0.317	99.6	0	109	119
income	0.0933	0.236	99.5	18.9	98.4	108
mean age group	0.248	0.279	99.5	4.25	107	126
Q1*	0.0009	0.148	99.1	49.3	89.2	96.4
Q2	0.317	0.257	99.5	11.6	102	109
Q3	0.406	0.273	99.6	6.22	104	111
Q4	0.572	0.291	99.6	0	106	113
Q5	0.367	0.289	99.6	0.63	105	112
Q6	—	—	—	—	—	—
Q7	0.655	0.291	99.6	0	106	113
Q8	—	—	—	—	—	—
Q9	0.504	0.292	99.6	0	106	113
Q10	0.276	0.292	99.6	0	105	112
Q11	—	—	—	—	—	—
W1	0.154	0.266	99.5	8.43	102	109
W2	0.901	0.285	99.6	2.12	105	113
W3	0.818	0.300	99.6	0	107	114
W4	0.74	0.259	99.5	11.1	103	110
W5	0.769	0.292	99.6	0	106	113
W6	0.953	0.305	99.6	0	107	115

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
GLIM, ≥ 18 years						
W7	0.703	0.309	99.6	0	108	115
W8	0.555	0.266	99.5	8.46	103	111
W9	0.736	0.292	99.6	0	106	113
W10	0.759	0.292	99.6	0	106	113
W11	—	—	—	—	—	—
W12	0.925	0.275	99.5	5.43	113	132
One-step GLIM, ≥ 18 years						
region	0.583	0.177	99.0	1.17	5200%	62.7
country	0.853	0.194	99.1	0	7060%	105
timepoint	0.905	0.24	99.1	0	57.5	68.2
genderratio	0.901	0.188	99.1	0	51.2	58.3
appliergroup	0.873	0.222	99.2	0	53.0	60.2
income	0.690	0.179	99.0	0.12	50.2	57.3
meanagegroup	0.548	0.166	98.7	7.37	52.5	65.0
Q1	0.384	0.173	99.0	3.29	48.0	53.3
Q2	0.923	0.214	99.1	0	50.8	56.2
Q3	0.172	0.200	99.1	0	48.1	53.5
Q4	0.383	0.180	99.1	0	48.2	53.6
Q5	0.341	0.179	99.1	0	48.0	53.4
Q6	—	—	—	—	—	—
Q7	—	—	—	—	—	—
Q8	—	—	—	—	—	—
Q9	0.677	0.189	99.1	0	49.2	54.6
Q10	—	—	—	—	—	—
Q11	0.630	0.193	99.1	0	50.7	57.8
W1	0.0829	0.198	99.1	0	46.9	52.2
W2	0.846	0.181	99.1	0	49.0	54.3
W3	0.896	0.186	99.1	0	49.3	54.6
W4	0.772	0.187	99.1	0	49.2	54.6
W5	0.699	0.180	99.1	0	48.8	54.2
W6	0.426	0.174	99.1	2.68	48.1	53.5
W7	0.219	0.166	99.0	7.57	47.0	52.3
W8	0.817	0.201	99.1	0	50.0	55.4
W9	—	—	—	—	—	—
W10	—	—	—	—	—	—
W11	—	—	—	—	—	—
W12	0.643	0.201	99.1	0	52.4	61.3
Two-step GLIM, NRS2002-GLIM, ≥ 18 years						
region	0.855	0.380	99.7	0	32.9	36.4
country	0.971	0.391	99.7	0	36.9	42.2
timepoint	0.978	0.439	99.6	0	36.3	40.8
genderratio	0.729	0.362	99.6	3.95	32.1	35.7
appliergroup	0.802	0.334	99.6	11.4	31.7	35.3
income	0.666	0.379	99.7	0	31.0	33.6
meanagegroup	0.65	0.469	99.6	0	37.9	44.1
Q1*	0.0492	0.177	99.2	53	24.1	26.8
Q2	0.826	0.303	99.6	19.6	29.4	32.1
Q3	0.316	0.247	99.5	34.4	27.4	30.1
Q4	—	—	—	—	—	—
Q5	0.872	0.385	99.7	0	31.3	33.9
Q6	—	—	—	—	—	—
Q7	—	—	—	—	—	—
Q8	—	—	—	—	—	—
Q9	0.859	0.367	99.6	2.45	30.9	33.5
Q10	0.957	0.380	99.7	0	31.2	33.9
Q11	0.815	0.300	99.6	20.4	31	34.6
W1	0.481	0.341	99.6	9.54	29.8	32.5
W2						
W3	—	—	—	—	—	—
W4	0.523	0.251	99.5	33.5	28.1	30.8
W5	0.937	0.382	99.7	0	31.2	33.9

Supplementary Table 8. Summary of meta-regression results for the prevalence of nutritional risk or malnutrition at admission (cont.)

CO-VARIABLES	*p* value (QM)	τ^2	I^2 (%)	R^2(%)	AIC	BIC
Two-step GLIM, NRS2002-GLIM, ≥ 18 years						
W6	0.273	0.259	99.4	31.2	27.4	30.1
W7	0.756	0.346	99.6	8.21	30.3	33.0
W8	0.375	0.344	99.6	8.77	29.6	32.2
W9	0.937	0.382	99.7	0	31.2	33.9
W10	0.957	0.380	99.7	0	31.2	33.9
W11	—	—	—	—	—	—
W12	0.0973	0.150	98.3	60.1	27.8	34.9

*p<0.05; #the final selected model; QM, omnibus test of moderators; τ^2, between-study variance; I^2, inconsistency index for heterogeneity; R^2, proportion of variance explained; AIC, Akaike information criterion; BIC, Bayesian information criterion.

1. Acehan S, Gulen M, Satar S et al. Evaluation of Nutrition Risk in Patients Over 65 Years of Age With Nontraumatic Acute Abdominal Syndrome. Nutr Clin Pract. 2020;35:1070–79. doi: 10.1002/ncp.10575.
2. Adly NN, Abd-El-Gawad WM, Abou-Hashem RM. Relationship between malnutrition and different fall risk assessment tools in a geriatric in-patient unit. Aging Clin Exp Res. 2020;32:1279–87. doi: 10.1007/s40520-019-01309-0.
3. Ahmadi S, Firoozi D, Dehghani M et al. Evaluation of Nutritional Status of Intensive Care Unit COVID-19 Patients Based on the Nutritional Risk Screening 2002 Score. Int J Clin Pract. 2022;2022:2448161. doi: 10.1155/2022/2448161.
4. Alamri A, Alaamer K, Almogbel Y et al. Prevalence of Malnutrition in People Hospitalized for Surgery: Prospective Cross-Sectional Study. Healthcare. 2025;13(4):380. doi: 10.3390/healthcare13040380.
5. Alikiaii B, Heidari Z, Fazeli A et al. Evaluation of the effectiveness of the Nutritional Risk Screening System 2002 (NRS-2002) in COVID-19 patients admitted to the intensive care unit. Int J Clin Pract. 2021;75(12):14934. doi: 10.1111/ijcp.14934.
6. Alvarez-Altamirano K, Bejarano-Rosales MP, Gonzalez-Rodriguez BK et al. Prevalence of nutritional risk and malnutrition in hospitalized patients: a retrospective, cross-sectional study of single-day screening. Appl Physiol Nutr Metab. 2024;49:838–43. doi: 10.1139/apnm-2023-0190.
7. Alvarez-Larruy M, Tomsen N, Guanyabens N, Palomeras E, Clavé P, Nascimento W. Spontaneous Swallowing Frequency in Post-Stroke Patients with and Without Oropharyngeal Dysphagia: An Observational Study. Dysphagia. 2023;38:200–10. doi: 10.1007/s00455-022-10451-3.
8. Aynaci G, Guksu Z. Nutritional screening and the impact of malnutrition on poor postoperative outcomes in gynecological oncology patients. Prog Nutr. 2019;21(1):127–34. doi: 10.23751/pn.v21i1.8044.
9. Azman M, Teo DS, Yunus MRM, Yean KT. Mid-Upper Arm Circumference vs. Quadriceps Muscle Layer Thickness as a Surrogate Measure of Fat Free Mass Index for GLIM Criteria Assessment among Head and Neck Cancer Patients. Int J Gerontol. 2021;15(3):266–71. doi: 10.6890/ijge.202107_15(3).0015.
10. Balci C, Bolayir B, Eşme M et al. Comparison of the Efficacy of the Global Leadership Initiative on Malnutrition Criteria, Subjective Global Assessment, and Nutrition Risk Screening 2002 in Diagnosing Malnutrition and Predicting 5-Year Mortality in Patients Hospitalized for Acute Illnesses. JPEN J Parenter Enteral Nutr. 2021;45:1172–80. doi: 10.1002/jpen.2016.
11. Bannert K, Sautter LF, Wiese ML et al. Analysis of ESPEN and GLIM algorithms reveals specific drivers for the diagnosis of malnutrition in patients with chronic gastrointestinal diseases. Nutrition. 2023;106:111887. doi: 10.1016/j.nut.2022.111887.
12. Barros TA, Cruvel JMDS, Silva BDM et al. Agreement between nutritional risk screening tools and anthropometry in hospitalized pediatric patients. Clin Nutr ESPEN. 2022;47:227–32. doi: 10.1016/j.clnesp.2021.12.008.
13. Bech CB, Svendsen JA, Knudsen AW, Munk T, Beck AM. The association between malnutrition and dehydration in older adults admitted to a geriatric unit: An observational study. Clin Nutr ESPEN. 2023;57:598–605. doi: 10.1016/j.clnesp.2023.08.011.
14. Borges K, Artacho R, Jodar-Graus R, Molina-Montes E, Ruiz-Lopez MD. Calf Circumference, a Valuable Tool to Predict Sarcopenia in Older People Hospitalized with Hip Fracture. Nutrients. 2022;14(20):4255. doi: 10.3390/nu14204255.
15. Boulhosa RSSB, Lourenco RP, Cortes DM, Oliveira LPM, Lyra AC, de Jesus RP. Comparison between criteria for diagnosing malnutrition in patients with advanced chronic liver disease: GLIM group proposal versus different nutritional screening tools. J Hum Nutr Diet. 2020;33:862–68. doi: 10.1111/jhn.12759.
16. Burgos R, Joaquín C, Blay C, Vaqué C. Disease-related malnutrition in hospitalized chronic patients with complex needs. Clin Nutr. 2020;39:1447–53. doi: 10.1016/j.clnu.2019.06.006.
17. Caliskan E, Dogan O. Synergistic effect of frailty and malnutrition on postoperative firstmonth mortality and delirium status among geriatric age group patients with hip fractures. Turk Geriatr Derg. 2019;22(2):140–49. doi: 10.31086/tjgeri.2019.87.
18. Can B, Senturk Durmus N, Olgun Yıldızeli S, Kocakaya D, Ilhan B, Tufan A. Nutrition risk assessed by Nutritional Risk Screening 2002 is associated with in-hospital mortality in older patients with COVID-19. Nutr Clin Pract. 2022;37:605–14. doi: 10.1002/ncp.10860.
19. Cano Megías M, Alfaro Martínez JJ, Fernández de Bobadilla Pascual B, Bellerive G, García Manzanares Vázquez de Agredos Á, Álvarez de Frutos V. Malnutrition risk prevalence in hospitalised patients in Castilla-La Mancha: Ten years after the PREDyCES® study. Endocrinol Diabetes Nutr (Engl Ed). 2023;70:492–500. doi: 10.1016/j.endien.2023.07.003.
20. Cao JJ, Xu HX, Li W et al. Nutritional assessment and risk factors associated to malnutrition in patients with esophageal cancer. Curr Probl Cancer. 2021;45(1):100638. doi: 10.1016/j.currproblcancer.2020.100638.
21. Cao Q, Huang YH, Jiang M, Dai C. The prevalence and risk factors of psychological disorders, malnutrition and quality of life in IBD patients. Scand J Gastroenterol. 2019;54:1458–66. doi: 10.1080/00365521.2019.1697897.
22. Carretero Gómez J, Galeano Fernández TF, Vidal Ríos AS et al. Malnutrition and sarcopenia worsen short- and long-term outcomes in internal medicine inpatients. Postgrad Med J. 2023;99(1168):56–62. doi: 10.1093/postmj/qgad006.

23. Carvalho J, Correia MA, Kanegusuku H et al. Association between the risk of malnutrition and functional capacity in patients with peripheral arterial disease: A cross-sectional study. PLoS One. 2022;17(9):e0273051. doi: 10.1371/journal.pone.0273051.
24. Celik ZM, Islamoglu AH, Sabuncular G, Toprak HS, Gunes FE. Evaluation of malnutrition risk of inpatients in a research and training hospital: A cross-sectional study. Clin Nutr ESPEN. 2021;41:261–67. doi: 10.1016/j.clnesp.2020.12.002.
25. Cervera-Díaz MDC, López-Gómez JJ, García-Virto V, Aguado-Hernández HJ, De Luis-Román DA. Prevalence of sarcopenia in patients older than 75 years admitted for hip fracture. Endocrinol Diabetes Nutr (Engl Ed). 2023;70:396–407. doi: 10.1016/j.endien.2023.06.001.
26. Chávez-Tostado M, Cervantes-Guevara G, López-Alvarado SE et al. Comparison of nutritional screening tools to assess nutritional risk and predict clinical outcomes in Mexican patients with digestive diseases. BMC Gastroenterol. 2020;20(1):79. doi: 10.1186/s12876-020-01214-1.
27. Chen J, Zhao C, Huang YZ et al. Malnutrition predicts poor outcomes in diabetic COVID-19 patients in Huangshi, Hubei. J Biomed Res. 2022;36:32–38. doi: 10.7555/jbr.35.20210083.
28. Chen LR, Liu CY, Cui HY et al. Malnutrition dynamics according to GLIM criteria in hospitalized elderly. Asia Pac J Clin Nutr. 2022;31:543–50. doi: 10.6133/apjcn.202209_31(3).0022.
29. Chen W, Ding Q, Zhang SK et al. Nutritional status in patients with active pulmonary tuberculosis and new nutritional risk screening model for active tuberculosis: a national, multicenter, cross-sectional study in China. J Thorac Dis. 2023;15:2779–99. doi: 10.21037/jtd-23-623.
30. Chen X, Liu X, Ji W et al. The PG-SGA outperforms the NRS 2002 for nutritional risk screening in cancer patients: a retrospective study from China. Front Nutr. 2023;10:1272420. doi: 10.3389/fnut.2023.1272420.
31. Clement D, van Leerdam ME, Tesselaar MET et al. The global leadership into malnutrition criteria reveals a high percentage of malnutrition which influences overall survival in patients with gastroenteropancreatic neuroendocrine tumours. J Neuroendocrinol. 2024;36(4):e13376. doi: 10.1111/jne.13376.
32. Çoban E. Malnutrition Rate in Stroke Patients on Admission. Sisli Etfal Hastan Tip Bul. 2019;53(3):272–75. doi: 10.14744/semb.2018.81994.
33. Cortes R, Yanez AM, Capitan-Moyano L, Millan-Pons A, Bennasar-Veny M. Evaluation of different screening tools for detection of malnutrition in hospitalised patients. J Clin Nurs. 2024;33:4759–71. doi: 10.1111/jocn.17170.
34. Dahl H, Warz SI, Welland NL, Arnesen I, Marti HP, Dierkes J. Factors associated with nutritional risk in patients receiving haemodialysis assessed by Nutritional Risk Screening 2002 (NRS2002). J Ren Care. 2022;48:112–18. doi: 10.1111/jorc.12374.
35. Dai LL, Li WL, Zheng DF, Wang WH, Xie HF, Ma JW. Prevalence and Management Recommendations for Disease-Related Malnutrition in Chronic Kidney Disease Patients with and without Diabetes. Int J Endocrinol. 2022;2022:4419486. doi: 10.1155/2022/4419486.
36. De Groot LM, Lee G, Ackerie A, van der Meij BS. Malnutrition Screening and Assessment in the Cancer Care Ambulatory Setting: Mortality Predictability and Validity of the Patient-Generated Subjective Global Assessment Short form (PG-SGA SF) and the GLIM Criteria. Nutrients. 2020;12(8):2287. doi: 10.3390/nu12082287.
37. Deng LH, Chi K, Zong Y, Li Y, Chen MG, Chen P. Malnutrition in patients with head and neck cancer undergoing radiotherapy: A cross-sectional study. Eur J Oncol Nurs. 2023;66:102387. doi: 10.1016/j.ejon.2023.102387.
38. Deng LM, Liu SP, Long JF et al. Prevalence of malnutrition and appropriateness of nutritional support in hospitalized patients: a GLIM-based study. Front Nutr. 2025;12:1667821. doi: 10.3389/fnut.2025.1667821.
39. Doganay M, Halil MG, Uyar M et al. Prevalence of malnutrition risk in hospitalized patients: a large nationwide study. J Health Popul Nutr. 2025;44(1):137. doi: 10.1186/s41043-025-00891-6.
40. Dou L, Wang X, Cao Y, Hu A, Li L. Relationship between Postoperative Recovery and Nutrition Risk Screened by NRS 2002 and Nutrition Support Status in Patients with Gastrointestinal Cancer. Nutr Cancer. 2020;72:33–40. doi: 10.1080/01635581.2019.1612927.
41. Efendioglu EM, Cigiloglu A, Turkbeyler IH. Malnutrition and Depressive Symptoms in Elderly Palliative Care Patients. J Palliat Care. 2022;37:503–09. doi: 10.1177/08258597211045500.
42. Elif Öztürk M, Yabancı Ayhan N. Evaluation of malnutrition and screening tools in hospitalized children. Clin Nutr ESPEN. 2023;57:770–78. doi: 10.1016/j.clnesp.2023.08.031.
43. Fernandes AC, Pessoa A, Vigário MA, Jager-Wittenaar H, Pinho J. Does malnutrition influence hospital reimbursement? A call for malnutrition diagnosis and coding. Nutrition. 2020;74:110750. doi: 10.1016/j.nut.2020.110750.
44. Fukui S, Kawakami M, Otaka Y et al. Malnutrition among elderly patients with severe aortic stenosis. Aging Clin Exp Res. 2020;32:373–79. doi: 10.1007/s40520-019-01227-1.
45. Gao B, Chen W, Liu Y et al. Associations between nutrition risk scores and sarcopenia in gastrointestinal cancer patients: a cross-sectional study. Support Care Cancer. 2022;30:3269–77. doi: 10.1007/s00520-021-06729-1.
46. Genest F, Rak D, Bätz E, Ott K, Seefried L. Sarcopenia and Malnutrition Screening in Female Osteoporosis Patients-A Cross-Sectional Study. J Clin Med. 2021;10(11):2344. doi: 10.3390/jcm10112344.
47. Geng H, Wang SJ, Jin Y et al. Nutritional Status and Body Composition in Wilson Disease: A Cross-Sectional Study From China. Front Nutr. 2021;8:790520. doi: 10.3389/fnut.2021.790520.
48. Godala M, Gaszynska E, Walczak K, Malecka-Wojciesko E. An Evaluation of the Usefulness of Selected Screening Methods in Assessing the Risk of Malnutrition in Patients with Inflammatory Bowel Disease. Nutrients. 2024;16(6):814. doi: 10.3390/nu16060814.

49. Gómez-Uranga A, Guzmán-Martínez J, Esteve-Atiénzar PJ et al. Nutritional and Functional Impact of Acute SARS-CoV-2 Infection in Hospitalized Patients. J Clin Med. 2022;11(9):2424. doi: 10.3390/jcm11092424.
50. Gregoriano C, Voelkle M, Koch D et al. Association of Different Malnutrition Parameters and Clinical Outcomes among COVID-19 Patients: An Observational Study. Nutrients. 2022;14(16):3449. doi: 10.3390/nu14163449.
51. Guan C, Lu T, Liao Z et al. Nutritional Status and Incidence of Radiation-Induced Oral Mucositis in Nasopharyngeal Carcinoma Patients Treated with Chemoradiotherapy. Nutr Cancer. 2024;76:196–206. doi: 10.1080/01635581.2023.2294523.
52. Feng G, Liu M, Li CY et al. The influence of the China GLIM standards on the diagnosis of malnutrition in patients with hematopoietic stem cell transplant. Front Nutr. 2022;9:1077442. doi: 10.3389/fnut.2022.1077442.

53. Gutiérrez-de-Santiago JL, Aguilar-Valdez S, Casas-Robles ML, Garza-Veloz I, Ortega-Cisneros V, Martínez-Fierro ML. Screening of nutritional risk: assessment of predictive variables of nutritional risk in hospitalized patients in a second-level care center in Mexico. Nutr Hosp. 2019;36:626–32. doi: 10.20960/nh.2394.
54. Hamdan MH, Badrasawi MM, Abu Alwafa RW. Nutrition and functional status among Palestinian cancer patients receiving chemotherapy. J Taibah Univ Med Sci. 2022;17(2):264–70. doi: 10.1016/j.jtumed.2021.11.006.
55. Hashemi ST, Kiaii BA, Mousavi S, Hosseinpour F. Evaluation of nutritional risk according to screening (NRS.2002) in multiple trauma patients admitted to ICU of Alzahra Hospital in Isfahan in 2018. Pak J Med Health Sci. 2021;15(6):1724–26. doi: 10.53350/pjmhs211561724.
56. Huang DD, Yu DY, Wang WB et al. Global leadership initiative in malnutrition (GLIM) criteria using hand-grip strength adequately predicts postoperative complications and long-term survival in patients underwent radical gastrectomy for gastric cancer. Eur J Clin Nutr. 2022;76:1323–31. doi: 10.1038/s41430-022-01109-2.
57. Huang SS, Niu Y, Liu XW, Gu ZY, Huang AY, Wu J. Characteristics of malnutrition according to Global Leadership Initiative on Malnutrition criteria in non-surgical patients with irritable bowel disease. Nutrition. 2022;94:111514. doi: 10.1016/j.nut.2021.111514.
58. Jazinaki MS, Norouzy A, Arabi SM, Moghadam M, Esfahani AJ, Safarian M. Two-step GLIM approach using NRS-2002 screening tool vs direct GLIM criteria application in hospital malnutrition diagnosis: A cross-sectional study. Nutr Clin Pract. 2024;39:1419–30. doi: 10.1002/ncp.11229.
59. Jiang M, Sun MY, Zhang X, Li RJ. Nutritional status and its association with in-hospital major adverse cardiac events in patients with severe heart failure: a prospective study. Nutr Hosp. 2022;39:256–65. doi: 10.20960/nh.03846.
60. Kaluzniak-Szymanowska A, Krzyminska-Siemaszko R, Deskur-Smielecka E, Lewandowicz M, Kaczmarek B, Wieczorowska-Tobis K. Malnutrition, Sarcopenia, and Malnutrition-Sarcopenia Syndrome in Older Adults with COPD. Nutrients. 2022;14(1):44. doi: 10.3390/nu14010044.
61. Kang LH, Liu XL, Ji W et al. Association of Neutrophil-to-Lymphocyte Ratio with Nutrition in Patients with Various Types of Malignant Tumors: A Multicenter Cross-Sectional Study. J Inflamm Res. 2023;16:1419–29. doi: 10.2147/jir.S401189.
62. Kasapoglu US, Gok A, Delen LA, Ozer AB. Comparison of nutritional risk status assessment tools in predicting 30-day survival in critically ill COVID-19 pneumonia patients. Ann Saudi Med. 2022;42:236–45. doi: 10.5144/0256-4947.2022.236.
63. Kaya AS, Pekcan G. Evaluation of preoperative nutritional status of patients with gastrointestinal cancer using different nutritional screening tests. Prog Nutr. 2020;22(3):e2020073. doi: 10.23751/pn.v22i3.9339.
64. Kaya AS, Bora S, Yetisyigit T. Evaluation of the Effect of Nutritional Status in Patients with Cancer Receiving Chemotherapy on Anthropometric Measurements and Quality of Life. Nutr Cancer. 2022;74:1994–2002. doi: 10.1080/01635581.2021.1984541.
65. Kaya DG, Akin ZC, Orucoglu B, Celik E. Comparison of four different nutritional risk screening tools in hospitalized children. Rev Nutr. 2023;36:e220239. doi: 10.1590/1678-9865202235e220239.
66. Kaźmierczak-Siedlecka K, Skonieczna-Żydecka K, Folwarski M, Ruszkowski J, Świerblewski M, Makarewicz W. Influence of malnutrition stage according to GLIM 2019 criteria and SGA on the quality of life of patients with advanced cancer. Nutr Hosp. 2020;37:1179–85. doi: 10.20960/nh.03185.
67. Kobayashi H, Inoue T, Ogawa M, Abe T, Tanaka T, Kakiuchi M. Malnutrition diagnosed by the Global Leadership Initiative on Malnutrition criteria as a predictor of gait ability in patients with hip fracture. Injury. 2022;53:3394–400. doi: 10.1016/j.injury.2022.08.004.
68. Kong X, Liu P, Wang G, Sun S, Li L. Methods for diagnosing malnutrition in patients with esophageal cancer, and the association with nutritional and inflammatory indices: A cross-sectional study. Oncol Lett. 2025;29(5):223. doi: 10.3892/ol.2025.14969.
69. Koroušić Seljak B, Mlakar Mastnak D, Mrevlje Ž, Veninšek G, Rotovnik Kozjek N. A multi-center survey on hospital malnutrition and cachexia in Slovenia. Eur J Clin Nutr. 2020;74:419–26. doi: 10.1038/s41430-019-0485-y.
70. Kumar S, Umarji A, Bhangale K et al. Association of Nutritional Status with Outcome among Elderly Patients Admitted with Respiratory Diseases in a Critical Care Unit: A Cross-sectional Study. J Clin Diagn Res. 2025;19(8):OC44–OC47. doi: 10.7860/JCDR/2025/80353.21407.
71. Lai XX, Zhu HW, Du HD, Huo XP, Yu K. Nutritional status of Chinese oldest-old adults (≥80 years of age): a cross-sectional study in Beijing. Eur J Clin Nutr. 2021;75:1040–46. doi: 10.1038/s41430-020-00826-w.
72. Lang JL, Shao YA, Liao JH et al. Patient-Generated Subjective Global Assessment (PG-SGA) predicts length of hospital stay in lung adenocarcinoma patients. Br J Nutr. 2022;127:1543–48. doi: 10.1017/s0007114521003500.
73. Leandro-Merhi VA, de Aquino JLB, Bertelli HD, Ramos GG, Mendes ET, Mendonça JA. Factors associated with patient weight loss and prescribed diet during hospitalization. Nutr Hosp. 2021;38:749–57. doi: 10.20960/nh.03249.
74. Leandro-Merhi VA, Dos Santos HAV, Almendra AAR, de Aquino JLB. Nutritional indicators' performance in malnutrition diagnosis of hospitalized elderly patients. Exp Gerontol. 2023;181:112286. doi: 10.1016/j.exger.2023.112286.
75. Lee B, Han HS, Yoon YS. Impact of Preoperative Malnutrition on Postoperative Long-Term Outcomes of Patients With Pancreatic Head Cancer. Ann Surg Open. 2021;2(1):e047. doi: 10.1097/as9.0000000000000047.
76. Lehmann U, Uhlmann K, Meichtry A et al. Malnutrition and sarcopenia in inpatient rehabilitation: prevalence and associations with changes in bodyweight, muscle strength, and functional independence. J Rehabil Med. 2025;57:jrm42215. doi: 10.2340/jrm.v57.42215.
77. Li Y, Liu F, Xie H, Zhu Y. Investigation and analysis of frailty and nutrition status in older adult patients with hip fracture. Nutr Clin Pract. 2023;38:1063–72. doi: 10.1002/ncp.10993.
78. Liu AH, Cong JJ, Wang Q et al. Risk of Malnutrition Is Common in Patients with Coronavirus Disease 2019 (COVID-19) in Wuhan, China: A Cross-sectional Study. J Nutr. 2021;151:1591–96. doi: 10.1093/jn/nxab009.
79. Liu CY, Lu ZH, Li ZJ, Xu JY, Cui HY, Zhu MW. Influence of Malnutrition According to the GLIM Criteria on the Clinical Outcomes of Hospitalized Patients With Cancer. Front Nutr. 2021;8:774636. doi: 10.3389/fnut.2021.774636.
80. Liu H, Song B, Jin J et al. Nutritional Risk, Health Outcomes, and Hospital Costs Among Chinese Immobile Older Inpatients: A National Study. Front Nutr. 2021;8:758657. doi: 10.3389/fnut.2021.758657.
81. Liu JF, Jiang QX, Liu J, Liu AL, Wang YH. Investigation and Analysis of Frailty and Nutritional Status in Patients With Inflammatory Bowel Disease. Crohns Colitis 360. 2025;7(2):otaf010. doi: 10.1093/crocol/otaf010.

82. Liu X, Cao J, Zhu Z et al. Nutritional risk and nutritional status in hospitalized older adults living with HIV in Shenzhen, China: a cross-sectional study. BMC Infect Dis. 2021;21(1):618. doi: 10.1186/s12879-021-06322-1.
83. Liu Y, Wang LT, Li ST et al. Associations Between Blood Trace Element Levels and Nutritional Status in Maintenance Hemodialysis. J Ren Nutr. 2021;31:661–68. doi: 10.1053/j.jrn.2020.12.007.
84. Liu Y, Song C, Wang X et al. Prevalence of malnutrition among adult inpatients in China: a nationwide cross-sectional study. Sci China Life Sci. 2025;68:1487–97. doi: 10.1007/s11427-023-2619-7.
85. Lueg G, Wirth R, Kwiatkowski J et al. Low Self-Perception of Malnutrition in Older Hospitalized Patients. Clin Interv Aging. 2020;15:2219–26. doi: 10.2147/cia.S278578.
86. Ma J, Yang X, Cao J, Huang M, Jiang J, Wu R. A comparative study of three nutritional risk screening tools in surgical inpatients with laryngeal cancer. Asia Pac J Clin Nutr. 2020;29:227–33. doi: 10.6133/apjcn.202007_29(2).0003.
87. Ma W, Cai B, Li HX et al. GLIM-defined malnutrition in patients with acute abdomen associated with poor prognosis and increased economic burden: A cross-sectional study. Nutr Clin Pract. 2024;39:1364–74. doi: 10.1002/ncp.11202.
88. Maeda K, Ishida Y, Nonogaki T, Mori N. Reference body mass index values and the prevalence of malnutrition according to the Global Leadership Initiative on Malnutrition criteria. Clin Nutr. 2020;39:180–84. doi: 10.1016/j.clnu.2019.01.011.
89. Makwana NR, Ram RV, Khambhati S. Screening of malnutrition using the mini-nutritional assessment among hospitalized elderly patients in Western Gujarat. Int J Health Allied Sci. 2020;9(2):132–35. doi: 10.4103/ijhas.IJHAS_102_19.
90. Marinho R, Pessoa A, Lopes M et al. Prevalence of Nutritional Risk at Admission in Internal Medicine Wards in Portugal: The Multicentre Cross-Sectional ANUMEDI Study. Acta Med Port. 2021;34:420–27. doi: 10.20344/amp.13182.
91. Marquez Mesa E, Guerra Cabrera AJ, Gomez de Segura IL, Suarez Llanos JP. Comparison of CIPA Nutritional Screening with GLIM Criteria for Malnutrition, Prognostic Evolution, and Association with Phase Angle in Hospitalized Patients. Nutrients. 2024;16(21):3652. doi: 10.3390/nu16213652.
92. Martins PM, Gomes TLN, Franco EP, Vieira LL, Pimentel GD. High neutrophil-to-lymphocyte ratio at intensive care unit admission is associated with nutrition risk in patients with COVID-19. JPEN J Parenter Enteral Nutr. 2022;46:1441–48. doi: 10.1002/jpen.2318.
93. Matsumoto Y, Iwai K, Namikawa N et al. The relationship between existing nutritional indicators and Global Leadership Initiative on Malnutrition (GLIM) criteria: A one-institution cross-sectional analysis. Clin Nutr. 2020;39:3099–104. doi: 10.1016/j.clnu.2020.01.016.
94. Meissner C, Tiegges S, Broehl M, Otto R, Ridwelski K. International study on the prevalence of malnutrition in centralized care for colorectal cancer patients. Innov Surg Sci. 2023;8(2):83–92. doi: 10.1515/iss-2023-0015.
95. Mercan Baspinar M, Guden A, Calik M, Mavis O, Kamat S, Basar H. Determination of malnutrition, frailty, polypharmacy, multimorbidity, and mortality risk in hospitalized elderly COVID-19 pneumonia cases with and without possible sarcopenia. Turk Geriatr Derg. 2024;27:239–47. doi: 10.29400/tjgeri.2024.397.
96. Miao JP, Quan XQ, Zhang CT et al. Comparison of two malnutrition risk screening tools with nutritional biochemical parameters, BMI and length of stay in Chinese geriatric inpatients: a multicenter, cross-sectional study. BMJ Open. 2019;9(2):e022993. doi: 10.1136/bmjopen-2018-022993.
97. Mishamandani ZJ, Norouzy A, Hashemian SM et al. Nutritional status of patients hospitalized in the intensive care unit: A comprehensive report from Iranian hospitals, 2018. J Crit Care. 2019;54:151–58. doi: 10.1016/j.jcrc.2019.08.001.
98. Mitani A, Iwai T, Shichinohe T et al. The Combined Usage of the Global Leadership Initiative on Malnutrition Criteria and Controlling Nutrition Status Score in Acute Care Hospitals. Ann Nutr Metab. 2021;77:178–84. doi: 10.1159/000516994.
99. Mphwanthe G, Columbus T, Wasambo L et al. Malnutrition prevalence at hospital admission and discharge based on the two-step Global Leadership Initiative on Malnutrition: A prospective observational study in Malawian adult patients. Nutr Clin Pract. 2025. doi: 10.1002/ncp.11347.
100. Munk T, Holmsted SF, Beck AM, Laursen L, Rasmussen HH, Knudsen AW. The effect of a digital energy- and protein-dense food concept with a nutritional tracker on dietary intake in hospitalized patients at nutritional risk - A one-day cross-sectional study. Clin Nutr ESPEN. 2025;68:523–29. doi: 10.1016/j.clnesp.2025.05.037.
101. Muresan BT, Núñez-Abad M, Artero A et al. Relation of Malnutrition and Nosocomical Infections in Cancer Patients in Hospital: An Observational Study. J Nutr Metab. 2022;2022:5232480. doi: 10.1155/2022/5232480.
102. Naaman RK, Bakhsh MA, Alsherebi RK, Sultan RM. Prevalence and Recognition of Malnutrition in Elderly Patients Admitted to a University Hospital in Jeddah, Saudi Arabia. Top Clin Nutr. 2023;38:318–26. doi: 10.1097/tin.0000000000000344.
103. Nguyen LHT, Dang AK, Tran TV et al. The role of nutritional risk evaluation in predicting adverse outcomes among patients with severe COVID-19 in Vietnam. Front Nutr. 2023;10:1245816. doi: 10.3389/fnut.2023.1245816.
104. Nishioka S, Matsushita T, Yamanouchi A et al. Prevalence and Associated Factors of Coexistence of Malnutrition and Sarcopenia in Geriatric Rehabilitation. Nutrients. 2021;13(11):3745. doi: 10.3390/nu13113745.
105. Nozawa Y, Nishitani-Yokoyama M, Shimada K et al. Nutritional Status in Patients Undergoing Phase II Cardiac Rehabilitation by Mini Nutritional Assessment. Cardiol Res. 2023;14:133–41. doi: 10.14740/cr1479.
106. Nozoe M, Yamamoto M, Masuya R, Inoue T, Kubo H, Shimada S. Prevalence of Malnutrition Diagnosed with GLIM Criteria and Association with Activities of Daily Living in Patients with Acute Stroke. J Stroke Cerebrovasc Dis. 2021;30(9):105989. doi: 10.1016/j.jstrokecerebrovasdis.2021.105989.
107. Nucci D, Gianfredi V, Ferrara P et al. Association between Malnutrition and Depression in Patients with Cancer: The Importance of Nutritional Status Evaluation in Cancer Care. Int J Environ Res Public Health. 2023;20(3):2295. doi: 10.3390/ijerph20032295.
108. Oguri M, Ishii H, Yasuda K, Sumi T, Takahashi H, Murohara T. Combined prognostic value of malnutrition using GLIM criteria and renal insufficiency in elderly heart failure. ESC Heart Fail. 2022;9:704–11. doi: 10.1002/ehf2.13685.
109. Omar OM, Tayel DI, Saleh RM, Ramadan MA. The malnutrition screening tool STRONGKIDS performed better than other screening tools for children hospitalised in Egypt. Acta Paediatr. 2024;113:1006–12. doi: 10.1111/apa.17123.
110. Oner O, Hanci V, Gurkok MC et al. The impact of malnutrition and frailty on morbidity and mortality in geriatric internal intensive care patients: a prospective study. Turk Geriatr Derg. 2024;27:135–45. doi: 10.29400/tjgeri.2024.387.
111. Ong SH, Chee WSS, Mageswary Lapchmanan L, Ong SN, Lua ZC, Yeo JXN. Validation of the Subjective Global Nutrition Assessment (SGNA) and Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP) to Identify Malnutrition in Hospitalized Malaysian Children. J Trop Pediatr. 2019;65(1):39–45. doi: 10.1093/tropej/fmy009.

112. Orell H, Pohju A, Tuokkola J et al. Time to act!-A cross-sectional study on how nutritional risk increases during hospitalization and associates with worse outcome. Clin Nutr ESPEN. 2023;57:364–74. doi: 10.1016/j.clnesp.2023.07.016.
113. Ostrowska JM, Wegierek DS, Steinhagen AJ. Applying various criteria to assess the nutritional status among hospitalised patients aged 65 and over. Prog Nutr. 2019;21(1):113–19. doi: 10.23751/pn.v21i1.6952.
114. Ottestad I, Thoresen L, Tangvik RJ et al. Inadequate nutritional care for malnourished patients in four university hospitals - The QuaNuT study. Clin Nutr Open Sci. 2024;54:63–77. doi: 10.1016/j.nutos.2024.01.002.
115. Ouaijan K, Hwalla N, Kandala NB, Mpinga EK. Prevalence of Malnutrition in Hospitalized Patients in Lebanon Using Nutrition Risk Screening (NRS-2002) and Global Leadership Initiative on Malnutrition (GLIM) Criteria and Its Association with Length of Stay. Healthcare. 2023;11(5):730. doi: 10.3390/healthcare11050730.
116. Ozorio GA, Ribeiro LMK, Santos BC et al. Exploring the use of the GLIM criteria to diagnose malnutrition in cancer inpatients. Nutrition. 2023;116:112195. doi: 10.1016/j.nut.2023.112195.
117. Ozsenel EB, Kahveci G, Pekcioglu Y, Guner B, Basat S. The Overlooked Threat of Malnutrition: A Point Prevalence Study Based on NRS-2002 Screening in a Tertiary Care Hospital. J Clin Med. 2025;14(11):3976. doi: 10.3390/jcm14113976.
118. Pham Thi Lan A, Le Ngoc Thao V, Doan Duy T, Pham Nhat T. Malnutrition and other associated factors among the hospitalized elderly in Vietnam: A cross-sectional study. Medicine. 2024;103(36):e39563. doi: 10.1097/MD.0000000000039563.
119. Pimentel RFW, Moraes GCD, Barcelos SGC, Figueiredo PCMD, Das Merces MC. Evaluation of Nutritional Risk and Prevalence of Obesity in Patients with Covid-19 in A Reference Hospital in Salvador, Bahia, Brazil: A Cross-Sectional Study. Int J Nutrol. 2021;14(1):11–15. doi: 10.1055/s-0041-1728680.
120. Pironi L, Sasdelli AS, Ravaioli F et al. Malnutrition and nutritional therapy in patients with SARS-CoV-2 disease. Clin Nutr. 2021;40:1330–37. doi: 10.1016/j.clnu.2020.08.021.
121. Polat O, Yuruyen M, Sonmezoz GB et al. Malnutrition risk frequency and independent risk factors associated with mortality in hospitalized elderly patients with COVID-19 in Turkey. Asia Pac J Clin Nutr. 2022;31:355–61. doi: 10.6133/apjcn.202209_31(3).0003.
122. Poveda MD, Suárez-de-la-Rica A, Minchot EC et al. The Prevalence and Impact of Nutritional Risk and Malnutrition in Gastrointestinal Surgical Oncology Patients: A Prospective, Observational, Multicenter, and Exploratory Study. Nutrients. 2023;15(14):3283. doi: 10.3390/nu15143283.
123. Qing H, Zhang X D, Yang E et al. Nutritional status and nutritional intervention of older inpatients in China. J Nutr Health Aging. 2024;28(3):100169. doi: 10.1016/j.jnha.2024.100169.
124. Quncuo C, Liang Y, Li QY et al. High Prevalence of Nutritional Risk Among Pulmonary Patients Living on the Tibetan Plateau. Front Nutr. 2022;9:872457. doi: 10.3389/fnut.2022.872457.
125. Rajan S, Dhamija E, Malhotra N et al. Nutritional assessment in gynecological cancers: Experience from an Indian tertiary care center. Eur J Obstet Gynecol Reprod Biol. 2025;310:113964. doi: 10.1016/j.ejogrb.2025.113964.
126. Reiner J, Koch K, Woitalla J et al. Body impedance analysis to estimate malnutrition in inflammatory bowel disease patients - A cross-sectional study. J Dig Dis. 2022;23(12):687–94. doi: 10.1111/1751-2980.13155.
127. Reyes L M, Garcia-Moreno R M, Lopez-Plaza B, Milla S P. Prevalence, Risk Factors, and Clinical Management of Disease-Related Malnutrition in Hospitalized Patients: A Descriptive Analysis Using GLIM and SGA Criteria. Nutrients. 2024;16(23):4099. doi: 10.3390/nu16234099.
128. Rinninella E, Cintoni M, De Lorenzo A et al. Risk, prevalence, and impact of hospital malnutrition in a Tertiary Care Referral University Hospital: a cross-sectional study. Intern Emerg Med. 2018;13:689–97. doi: 10.1007/s11739-018-1884-0.
129. Rivelsrud M, Paur I, Sygnestveit K, Nilsen RM, Tangvik RJ. Nutritional treatment is associated with longer survival in patients with pancreatic disease and concomitant risk of malnutrition. Clin Nutr. 2021;40:2128–37. doi: 10.1016/j.clnu.2020.09.037.
130. Rosato E, Gigante A, Gasperini ML, Proietti L, Muscaritoli M. Assessing Malnutrition in Systemic Sclerosis With Global Leadership Initiative on Malnutrition and European Society of Clinical Nutrition and Metabolism Criteria. JPEN J Parenter Enteral Nutr. 2021;45:618–24. doi: 10.1002/jpen.1872.
131. Ruiz-Rosso R, Moreno-Camara S, Gutierrez-Sanchez B, da-Silva-Domingues H, Del-Pino-Casado R, Palomino-Moral PA. Factors Influencing Nutritional Status in Hospitalized Individuals Aged 70 and Above. Nutrients. 2024;16(5):645. doi: 10.3390/nu16050645.
132. Sánchez-Torralvo FJ, Contreras-Bolívar V, Ruiz-Vico M et al. Relationship between malnutrition and the presence of symptoms of anxiety and depression in hospitalized cancer patients. Support Care Cancer. 2022;30:1607–13. doi: 10.1007/s00520-021-06532-y.
133. Santos IM, Mendes L, Carolino E, Santos CA. Nutritional Status, Functional Status, and Quality of Life - What is the Impact and Relationship on Cancer Patients? Nutr Cancer. 2021;73:2554–67. doi: 10.1080/01635581.2020.1839520.
134. Santos MLDD, Leite LO, Lages ICF. Prevalence of malnutrition, according to the GLIM criteria, in patients who are the candidates for gastrointestinal tract surgery. Arq Bras Cir Dig. 2022;35:e1663. doi: 10.1590/0102-672020210002e1663.
135. Sanz-París A, Martín-Palmero A, Gomez-Candela C et al. GLIM Criteria at Hospital Admission Predict 8-Year All-Cause Mortality in Elderly Patients With Type 2 Diabetes Mellitus: Results From VIDA Study. JPEN J Parenter Enteral Nutr. 2020;44:1492–500. doi: 10.1002/jpen.1781.
136. Shabanpur M, Pourmahmoudi A, Nicolau J et al. The importance of nutritional status on clinical outcomes among both ICU and Non-ICU patients with COVID-19. Clin Nutr ESPEN. 2022;49:225–31. doi: 10.1016/j.clnesp.2022.04.016.
137. Shimizu A, Maeda K, Honda T et al. Comparison between the Global Leadership Initiative on Malnutrition and the European Society for Clinical Nutrition and Metabolism definitions for the prevalence of malnutrition in geriatric rehabilitation care. Geriatr Gerontol Int. 2020;20(12):1221–27. doi: 10.1111/ggi.14072.
138. Silva RJG, Grippa WR, Neto L et al. Factors Associated with the Nutritional Status of Women with Non-Metastatic Breast Cancer in a Brazilian High Complexity Oncology Center. Nutrients. 2023;15(23):4961. doi: 10.3390/nu15234961.
139. Skeie E, Tangvik RJ, Nymo LS, Harthug S, Lassen K, Viste A. Weight loss and BMI criteria in GLIM's definition of malnutrition is associated with postoperative complications following abdominal resections - Results from a National Quality Registry. Clin Nutr. 2020;39:1593–99. doi: 10.1016/j.clnu.2019.07.003.
140. Skeie E, Sygnestveit K, Nilsen RM, Harthug S, Koch AM, Tangvik RJ. Prevalence of patients "at risk of malnutrition" and nutritional routines among surgical and non-surgical patients at a large university hospital during the years 2008-2018. Clin Nutr. 2021;40:4738–44. doi: 10.1016/j.clnu.2021.05.029.

141. Slettahjell HB, Bastakis M, Biering-Sorensen F, Strom V, Henriksen C. Defining malnutrition in persons with spinal cord injury - does the Global Criteria for Malnutrition work? Food Nutr Res. 2024;68:9989. doi: 10.29219/fnr.v68.9989.
142. Song D, Zhang L, Zhang Y et al. Risk factors for inpatient malnutrition and length of stay assessed by 'NutritionDay' in China. Asia Pac J Clin Nutr. 2022;31:561–69. doi: 10.6133/apjcn.202209_31%283%29.0024.
143. Song MM, Zhang Q, Liu T et al. Efficacy of Global Leadership Initiative on Malnutrition as potential cachexia screening tool for patients with solid cancer. Nutr J. 2022;21(1):9. doi: 10.1186/s12937-022-00829-2.
144. Sun WJ, Li GC, Zhang J, Zhu J, Zhang Z. The role of nutritional assessment for predicting radiotherapy-induced adverse events in patients with gastric cancer. Br J Radiol. 2022;95(1130):20201004. doi: 10.1259/bjr.20201004.
145. Susetyowati, Budiningsari RD, Widodo P. Association of malnutrition screening tools with nutritional assessment parameters in hospitalized adult patients. Pak J Nutr. 2019;18(12):1145–52. doi: 10.3923/pjn.2019.1145.1152.
146. Tan S, Jiang J, Qiu L et al. Prevalence of Malnutrition in Patients with Hepatocellular Carcinoma: A Comparative Study of GLIM Criteria, NRS2002, and PG-SGA, and Identification of Independent Risk Factors. Nutr Cancer. 2024;76:335–44. doi: 10.1080/01635581.2024.2314317.
147. Thiam CN, Mathavan S, Abdullah A, Chong EGM. Malnutrition among patients admitted to the subacute geriatric ward during the COVID-19 pandemic era: A cross-sectional study in a tertiary hospital in Malaysia. Med J Malaysia. 2022;77(3):313–19. doi: N/A.
148. Thomas J, Delaney C, Miller M. The ability of the Global Leadership Initiative on Malnutrition (GLIM) to diagnose protein-energy malnutrition in patients requiring vascular surgery: A validation study. Br J Nutr. 2023;129:49–53. doi: 10.1017/s0007114522000344.
149. Thomsen TK, Pedersen JL, Sloth B, Damsgaard EM, Rud CL, Hvas CL. Nutritional risk screening in a Danish university hospital is insufficient and may underestimate nutritional risk: A cross-sectional study. J Hum Nutr Diet. 2023;36:108–15. doi: 10.1111/jhn.13025.
150. Tran TP, Nguyen LT, Hirose K et al. Malnutrition is associated with dysphagia in Vietnamese older adult inpatients. Asia Pac J Clin Nutr. 2021;30(4):588–94. doi: 10.6133/apjcn.202112_30(4).0005.
151. Trollebø MA, Skeie E, Revheim I et al. Comparison of nutritional risk screening with NRS2002 and the GLIM diagnostic criteria for malnutrition in hospitalized patients. Sci Rep. 2022;12(1):19743. doi: 10.1038/s41598-022-23878-3.
152. Tu Y, Chen F, Yu Q, Song L, Chen M. Application of NRS2002 and PG-SGA in nutritional assessment for perioperative patients with head and neck squamous cell carcinoma: An observational study. Medicine. 2024;103(43):e40025. doi: 10.1097/MD.0000000000040025.
153. Wang J, Xu Q, Xie H et al. Comparison of the Global Leadership Initiative on Malnutrition and the Patient-Generated Subjective Global Assessment for diagnosing malnutrition in patients undergoing surgery for hepatobiliary and pancreatic malignancies. Nutr Hosp. 2024;41:835–42. doi: 10.20960/nh.05056.
154. Wang R, Huang L, Xu M, Yu X, Wang H. Comparison of different nutritional screening tools in nutritional screening of patients with cirrhosis: A cross-sectional observational study. Heliyon. 2024;10(10):e30339. doi: 10.1016/j.heliyon.2024.e30339.
155. Wang JJ, Zhuang QL, Tan SJ et al. Loss of body weight and skeletal muscle negatively affect postoperative outcomes after major abdominal surgery in geriatric patients with cancer. Nutrition. 2023;106:111907. doi: 10.1016/j.nut.2022.111907.
156. Wang L, Li P, Hu Y et al. Relationship between preoperative malnutrition, frailty, sarcopenia, body composition, and anthropometry in elderly patients undergoing major pancreatic and biliary surgery. Front Nutr. 2023;10:1135854. doi: 10.3389/fnut.2023.1135854.
157. Wang W, Dai L, Ma J, Gu L, Xie H, Fu J. Malnutrition accelerates the occurrence of infectious complications in patients with chronic kidney disease: A cross-sectional survey of 682 patients with chronic kidney disease. Nutr Clin Pract. 2023;38:1167–74. doi: 10.1002/ncp.11040.
158. Wei W, Yan PG, Wang F et al. Malnutrition Defined by the Global Leadership Initiative on Malnutrition (GLIM) Criteria in Hospitalized Patients with Ulcerative Colitis and Its Association with Clinical Outcomes. Nutrients. 2023;15(16):3572. doi: 10.3390/nu15163572.
159. Xie B, Sun Y, Sun J, Deng T, Jin B, Gao J. Applicability of five nutritional screening tools in Chinese patients undergoing colorectal cancer surgery: a cross-sectional study. BMJ Open. 2022;12(5):e057765. doi: 10.1136/bmjopen-2021-057765.
160. Xie LL, Jiang JJ, Fu HB, Zhang WY, Yang L, Yang M. Malnutrition in Relation to Muscle Mass, Muscle Quality, and Muscle Strength in Hospitalized Older Adults. J Am Med Dir Assoc. 2022;23:722–28. doi: 10.1016/j.jamda.2021.11.025.
161. Xu JY, Zhu MW, Zhang H et al. A Cross-Sectional Study of GLIM-Defined Malnutrition Based on New Validated Calf Circumference Cut-off Values and Different Screening Tools in Hospitalised Patients over 70 Years Old. J Nutr Health Aging. 2020;24:832–38. doi: 10.1007/s12603-020-1386-4.
162. Xu LB, Shi MM, Huang ZX et al. Impact of malnutrition diagnosed using Global Leadership Initiative on Malnutrition criteria on clinical outcomes of patients with gastric cancer. JPEN J Parenter Enteral Nutr. 2022;46:385–94. doi: 10.1002/jpen.2127.
163. Yang JY, Zhu JY, Cao PL et al. Applicability of Global Leadership Initiative on Malnutrition (GLIM) criteria in nutrition risk screening for patients over 60 years old with digestive system tumors - A retrospective study. Nutr Clin Metab. 2024;38:194–202. doi: 10.1016/j.nupar.2024.06.002.
164. Yang W, Guo G, Cui B et al. Malnutrition according to the Global Leadership Initiative on Malnutrition criteria is associated with in-hospital mortality and prolonged length of stay in patients with cirrhosis. Nutrition. 2023;105:111860. doi: 10.1016/j.nut.2022.111860.
165. Yang W, Guo G, Mao L et al. Comparison of the GLIM criteria with specific screening tool for diagnosing malnutrition in hospitalized patients with cirrhosis: A descriptive cross-sectional study. JPEN J Parenter Enteral Nutr. 2023;47:310–21. doi: 10.1002/jpen.2452.
166. Yogesh M, Patel J, Makwana N, Mody M. The triad of physiological challenges: investigating the intersection of sarcopenia, malnutrition, and malnutrition-sarcopenia syndrome in patients with COPD - a cross-sectional study. BMC Pulm Med. 2024;24(1):71. doi: 10.1186/s12890-024-02884-3.
167. Yu Y, Ye J, Chen M et al. Malnutrition Prolongs the Hospitalization of Patients with COVID-19 Infection: A Clinical Epidemiological Analysis. J Nutr Health Aging. 2021;25:369–73. doi: 10.1007/s12603-020-1541-y.
168. Yuksel B, Edeer AD. Evaluation of preoperative nutritional status of patients with gastrointestinal cancer using different nutritional screening tests. Turk Geriatr Derg. 2022;25(4):632–39. doi: 10.31086/tjgeri.2022.322.

169. Zezelj SP, Malec D, Labinac DJ et al. Nutritional risk screening in gastroenterological patients at the rijeka university hospital centre. Acta Clin Croat. 2020;59(4):632–40. doi: 10.20471/acc.2020.59.04.09.
170. Zhang Q, Yu S, Li Q, Zhang M, Meng L, Hu S. Preoperative Nutritional Status in Elderly Inpatients with Gastrointestinal Cancer and Its Linear Association with Frailty. Nutr Cancer. 2022;74:1376–87. doi: 10.1080/01635581.2021.1955284.
171. Zhang Y, Zhang L, Gao X et al. Validation of the GLIM criteria for diagnosis of malnutrition and quality of life in patients with inflammatory bowel disease: A multicenter, prospective, observational study. Clin Nutr. 2022;41:1297–306. doi: 10.1016/j.clnu.2022.04.016.
172. Zhang Z, Wan Z, Zhu Y, Zhang L, Zhang L, Wan H. Prevalence of malnutrition comparing NRS2002, MUST, and PG-SGA with the GLIM criteria in adults with cancer: A multi-center study. Nutrition. 2021;83:111072. doi: 10.1016/j.nut.2020.111072.
173. Zheng J, Yu FM, Chen YY, Ming F, Rao ZY. The Practice of Nutrition Risk Screening, Nutrition Status Assessment, and Nutrition Support Action (NRASA) in Hospitalized Patients. Top Clin Nutr. 2023;38:249–61. doi: 10.1097/tin.0000000000000311.
174. Zhou B, Zhang Y, Hiesmayr M et al. Dietary Provision, GLIM-Defined Malnutrition and Their Association with Clinical Outcome: Results from the First Decade of nutritionDay in China. Nutrients. 2024;16(4):569. doi: 10.3390/nu16040569.
175. Zhou LM, Fu JY, Ding Z, Jin KM, Wu RJX, Ye LX. Comparison of GLIM, SGA, PG-SGA, and PNI in diagnosing malnutrition among hepatobiliary-pancreatic surgery patients. Front Nutr. 2023;10:1116243. doi: 10.3389/fnut.2023.1116243.
176. Zhou LP, Yu DY, Ma BW et al. Feasibility of substituting handgrip strength for muscle mass as a constituent standard in the Global Leadership Initiative on Malnutrition for diagnosing malnutrition in patients with gastrointestinal cancers. Nutrition. 2021;84:111044. doi: 10.1016/j.nut.2020.111044.
177. Zhou L, Ding Z, Wang Q, Wu R, Jin K. Evaluation of malnutrition by objective nutritional indexes and predictors in hospitalized patients with COVID-19. J Clin Biochem Nutr. 2024;75:153–60. doi: 10.3164/jcbn.24-73.
178. Zhou X, Wu XN, Deng B, Huang LJ. Comparative Survey on Nutrition Risk and Nutrition Support Among Hospitalized General Surgery Patients Over a 7-Year Period. JPEN J Parenter Enteral Nutr. 2020;44:1468–74. doi: 10.1002/jpen.1784.
179. Zuo J, Huang Y, Huang Z et al. Comparison of three objective nutritional screening tools for identifying GLIM-defined malnutrition in patients with gastric cancer. Eur J Clin Nutr. 2025;79:64–70. doi: 10.1038/s41430-024-01514-9.

Supplementary Table 9. Summary of subgroup analysis results for the prevalence of nutritional risk or malnutrition at admission

Tool	Subgroups with Significant Differences ($p < 0.05$)	Subgroups without Significant Differences ($p \geq 0.05$)
NRS2002 (adult)	Gender, region, country	timepoint, gender ratio (female: male), applier, income level
MNA-SF	Severity, country	Region, timepoint, gender ratio (female: male), applier, income level
GLIM	Region, country, income level	Timepoint, gender ratio (female: male), applier
One-Step GLIM	Country	Region, gender, severity, timepoint, gender ratio (female: male), applier, income level
Two-Step GLIM (NRS2002 first, adult)	--	Country, region, timepoint, gender ratio (female: male), applier, income level
Two-Step GLIM (MNA-SF first)	Country, gender ratio (female: male)	Region, timepoint, income level

-, not applicable.