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Lay health workers in primary and community health care for maternal and child health: identification and treatment of wasting in children (Review)

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[Intervention Review]

Lay health workers in primary and community health care for maternal and child health: identification and treatment of wasting in children

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ABSTRACT

Background

Since the early 2010s, there has been a push to enhance the capacity to effectively treat wasting in children through community-based service delivery models and thus reduce morbidity and mortality.

Objectives

To assess the effectiveness of identification and treatment of moderate and severe wasting in children aged five years or under by lay health workers working in the community compared with health providers working in health facilities.

Search methods

We searched MEDLINE, CENTRAL, two other databases, and two ongoing trials registers to 24 September 2021. We also screened the reference lists of related systematic reviews and all included studies.

Selection criteria

We included randomised controlled trials (RCTs) and non-randomised studies in children aged five years or under with moderate wasting (defined as weight-for-height Z-score (WHZ) below −2 but no lower than ≥ −3, or mid-upper-arm circumference (MUAC) below 125 mm but no lower than 115 mm, and no nutritional oedema) or severe wasting (WHZ below −3 or MUAC below 115 mm or nutritional oedema).

Eligible interventions were:

- identification by lay health workers (LHWs) of children with wasting (intervention 1);
- identification by LHWs of children with wasting and medical complications needing referral (intervention 2); and
- identification by LHWs of children with wasting without medical complications needing referral (intervention 3).

Eligible comparators were:

• identification and treatment of wasting by health professionals such as nurses or doctors (at health facilities); and
• identification and treatment of wasting by health facility-based teams, including health professionals and LHWs.

Data collection and analysis

Two review authors independently screened trials, extracted data and assessed risk of bias using the Cochrane risk of bias tool (RoB 2) and Cochrane Effective Practice and Organisation of Care (EPOC) guidelines. We used a random-effects model to meta-analyse data, producing risk ratios (RRs) for dichotomous outcomes in trials with individual allocation, adjusted RRs for dichotomous outcomes in trials with cluster allocation (using the generic inverse variance method in Review Manager 5), and mean differences (MDs) for continuous outcomes. We used the GRADE approach to assess the certainty of the evidence.

Main results

We included two RCTs and five non-RCTs. Six studies were from African countries, and one was from Pakistan. Six studies included children with severe wasting, and one included children with moderate wasting. All studies offered home-based ready-to-use therapeutic food treatment and monitoring. Children received antibiotics in three studies, vitamins or micronutrients in three studies, and deworming treatment in two studies. In three studies, the comparison arm involved LHWs screening children for malnutrition and referring them to health facilities for diagnosis and treatment.

All the non-randomised studies had a high overall risk of bias.

Interventions 1 and 2

Identification and referral for treatment by LHWs, compared with treatment by health professionals following self-referral, may result in little or no difference in the percentage of children who recover from moderate or severe wasting (MD 1.00%, 95% confidence interval (CI) −2.53 to 4.53; 1 RCT, 29,475 households; low certainty).

Intervention 3

Compared with treatment by health professionals following identification by LHWs, identification and treatment of severe wasting in children by LHWs:

• may slightly reduce improvement from severe wasting (RR 0.93, 95% CI 0.86 to 0.99; 1 RCT, 789 participants; low certainty);
• may slightly increase non-response to treatment (RR 1.44, 95% CI 1.04 to 2.01; 1 RCT, 789 participants; low certainty);
• may result in little or no difference in the number of children with WHZ above −2 on discharge (RR 0.94, 95% CI 0.28 to 3.18; 1 RCT, 789 participants; low certainty);
• probably results in little or no difference in the number of children with WHZ between −3 and −2 on discharge (RR 1.09, 95% CI 0.87 to 1.36; 1 RCT, 789 participants; moderate certainty);
• probably results in little or no difference in the number of children with WHZ below −3 (severe wasting) on discharge (RR 1.23, 95% CI 0.75 to 2.04; 1 RCT, 789 participants; moderate certainty);
• probably results in little or no difference in the number of children with MUAC equal to or greater than 115 mm on discharge (RR 0.99, 95% CI 0.93 to 1.06; 1 RCT, 789 participants; moderate certainty);
• results in little or no difference in weight gain per day (mean weight gain 0.50 g/kg/day higher, 95% CI 1.74 lower to 2.74 higher; 1 RCT, 571 participants; high certainty);
• probably has little or no effect on relapse of severe wasting (RR 1.03, 95% CI 0.69 to 1.54; 1 RCT, 649 participants; moderate certainty);
• may have little or no effect on mortality among children with severe wasting (RR 0.46, 95% CI 0.04 to 5.98; 1 RCT, 829 participants; low certainty);
• probably has little or no effect on the transfer of children with severe wasting to inpatient care (RR 3.71, 95% CI 0.36 to 38.23; 1 RCT, 829 participants; moderate certainty); and
• probably has little or no effect on the default of children with severe wasting (RR 1.48, 95% CI 0.65 to 3.40; 1 RCT, 829 participants; moderate certainty).

The evidence was very uncertain for total MUAC gain, MUAC gain per day, total weight gain, treatment coverage, and transfer to another LHW site or health facility.

No studies examined sustained recovery, deterioration to severe wasting, appropriate identification of children with wasting or oedema, appropriate referral of children with moderate or severe wasting, adherence, or adverse effects and other harms.

Authors' conclusions

Identification and treatment of severe wasting in children who do not require inpatient care by LHWs, compared with treatment by health professionals, may lead to similar or slightly poorer outcomes. We found only two RCTs, and the evidence from non-randomised studies was of very low certainty for all outcomes due to serious risks of bias and imprecision. No studies included children aged under 6 months. Future studies must address these methodological issues.

PLAIN LANGUAGE SUMMARY

Can lay health workers effectively identify and treat wasting in children?

The aim of this Cochrane Review was to find out whether lay health workers were more or less effective than health professionals at identifying and treating children with wasting.

Key messages

The results of this review suggest that children who receive care from lay health workers for severe wasting may have similar or slightly poorer results than children who receive care from health professionals.

What is wasting?

Childhood wasting refers to children being too thin for their height. Wasting happens when the child does not have enough food or enough healthy food, or because of disease. Children suffering from wasting are more often sick, can have developmental problems, and are more likely to die, particularly when the wasting is severe. Millions of children suffer from wasting, and most of them live in poor countries.

The best solution to this problem is to stop wasting occurring in the first place. When this is not possible, it is important to identify and treat children with wasting as soon as possible. However, treatment can take weeks or months, and it may be difficult or expensive for families to access care. As a result, many children are not getting the help they need.

What is a lay health worker?

One way of increasing children's access to care is to use lay health workers. A lay health worker is a member of the community who has received some training to carry out certain healthcare services but is not a healthcare professional. Research has shown that lay health workers are useful in some health interventions, such as increasing breastfeeding and childhood vaccination.

What did we want to find out?

In this review, we wanted to find whether lay health workers can effectively identify and treat moderate to severe wasting in children aged five years or younger. We looked for studies that evaluated the effect of using lay health workers in the community compared with health professionals working in health facilities.

What did we find?

We included seven studies in this review. Six studies were from African countries, and one study was from Pakistan. Six studies included children with severe wasting, and one included children with moderate wasting. In some studies, lay health workers identified children with wasting and then referred them to clinics for treatment. In the other studies, lay health workers also treated the children.

All studies compared lay health workers with health professionals. No studies included children younger than 6 months old.

Key results

Identification and referral of children with wasting by lay health professionals, compared with treatment by health professionals after self-referral, may make little or no difference to the number of children who recover from moderate or severe wasting.

Identification and treatment of children with severe wasting by lay health workers, compared with treatment by health professionals after identification and referral by lay health workers:

- may slightly reduce response to treatment (60 fewer children per 1000 responding to treatment);
- may have little or no effect on the number of children who gain weight;
- probably has little or no effect on the amount of weight gained;
- probably has little or no effect on the number of children who relapse;
- probably has little or no effect on the number of children who are transferred to inpatient care;
- probably has little or no effect on the number of children who drop out of treatment; and
- may have little or no effect on the number of children who die.

How up-to-date is this evidence?

We searched for studies that had been published up to 24 September 2021.

SUMMARY OF FINDINGS

Summary of findings 1. Summary of findings – Randomised controlled trials

Summary of findings

Identification or treatment by lay health workers compared to health professionals for wasting in children

Patient or population: children aged > 6 months and ≤ 5 years with wasting

Setting: Malawi (Wroe 2021), Pakistan (Hussain 2021)

Intervention: identification and referral (Wroe 2021) or identification and treatment (Hussain 2021) by LHWs

Comparison: treatment by health professionals following self-referral (Wroe 2021) or following identification and referral by LHWs (Hussain 2021)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with health professionals	Risk with lay health workers				
Anthropometric recovery: percentage of children who recover from moderate or severe wasting Defined as % children aged 6–59 months who recovered in treatment programmes for moderate or severe malnutrition (Wroe 2021)	The mean recovery from moderate or severe wasting was 95.9 %	**MD1.00% higher** (2.53 lower to 4.53 higher)	—	90 cluster-months, 29,475 households (1 RCT)	⊕⊕⊖⊖ **Low**[a]	Identification and referral for treatment by LHWs, compared with treatment by health professionals following self-referral, may result in little or no difference in the percentage of children who recover from moderate or severe wasting.
Anthropometric recovery: improvement from severe wasting Defined as MUAC ≥ 115 mm, clinically well, absence of oedema for 2 consecutive visits, and minimum stay of 8 weeks in the programme (Hussain 2021)	856 per 1000	796 per 1000 (736 to 847)	**RR 0.93** (0.86 to 0.99)	789 (1 RCT)	⊕⊕⊖⊖ **Low**[b]	Identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may slightly reduce improvement in severe wasting in children.

Non-response to treatment Defined as not meeting the criteria for recovery within 4 months Hussain 2021	144 per 1000	208 per 1000 (150 to 290)	**RR 1.44** (1.04 to 2.01)	789 (1 RCT)	⊕⊕⊖⊖ **Low**[c]	Identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may lead to a slight increase in non-response to treatment for wasting in children.
Sustained recovery	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Anthropometric outcomes: number of children with normal or underweight WHZ on discharge Defined as WHZ > −2 (Hussain 2021)	617 per 1000	580 per 1000 (173 to 1000)	**RR 0.94** (0.28 to 3.18)	789 (1 RCT)	⊕⊕⊖⊖ **Low**[d]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may result in little or no difference in the number of children with WHZ in the non-wasting range (> −2) on discharge.
Anthropometric outcomes: number of children with WHZ in moderate wasting range on discharge Defined as WHZ between −3 and −2 (Hussain 2021)	289 per 1000	315 per 1000 (251 to 393)	**RR 1.09** (0.87 to 1.36)	789 (1 RCT)	⊕⊕⊕⊖ **Moderate**[e]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with WHZ in the moderate wasting range (−3 to −2) on discharge.
Anthropometric outcomes: number of children with WHZ in severe wasting range on discharge Defined as WHZ < −3: Hussain 2021	73 per 1000	90 per 1000 (55 to 150)	**RR 1.23** (0.75 to 2.04)	789 (1 RCT)	⊕⊕⊕⊖ **Moderate**[f]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with WHZ in the severe wasting range (< −3) on discharge.
Anthropometric outcomes: number of children with MUAC ≥ 115 mm on discharge (Hussain 2021)	843 per 1000	834 per 1000 (784 to 893)	**RR 0.99** (0.93 to 1.06)	789 (1 RCT)	⊕⊕⊕⊖ **Moderate**[g]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with MUAC ≥ 115 mm on discharge.
Anthropometric outcomes: weight gain per day (g/kg/day)	The mean weight gain was 4.8 g/kg/d	**MD 0.50 g/kg/day higher** (1.74 lower to 2.74 higher)	—	571 (1 RCT)	⊕⊕⊕⊕ **High**	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, results

Calculated as ((discharge weight − admission weight)/ weight on admission)/days in treatment among recovered children (Hussain 2021)						in little or no difference in weight gain per day (g/kg/d) in children diagnosed with severe wasting.
Relapse Defined as MUAC < 115 mm within 2 months after recovery (Hussain 2021)	141 per 1000	145 per 1000 (97 to 217)	**RR 1.03** (0.69 to 1.54)	649 (1 RCT)	⊕⊕⊕⊖ **Moderate**[g]	Identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on relapse of severe wasting in children.
Deterioration to severe wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Transfer to inpatient care Defined as referral for complications such as fever, pneumonia, anorexia or dehydration (Hussain 2021)	3 per 1000	9 per 1000 (1 to 96)	**RR 3.71** (0.36 to 38.23)	829 (1 RCT)	⊕⊕⊕⊖ **Moderate**[e]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on transfer of children with severe wasting to inpatient care.
Mortality among children with severe wasting	5 per 1000	2 per 1000 (0 to 30)	**RR 0.46** (0.04 to 5.98)	829 (1 RCT) (Hussain 2021)	⊕⊕⊖⊖ **Low**[h]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may have little or no effect on mortality.
Appropriate identification of children with wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Appropriate identification of children with oedema	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Appropriate referral of children with moderate or severe wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Treatment coverage	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Caregiver adherence to care plans	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.

Default from care Defined as absence on 2 consecutive visits (Hussain 2021)	25 per 1000	37 per 1000 (16 to 85)	**RR 1.48** (0.65 to 3.40)	829 (1 RCT)	⊕⊕⊕⊖ **Moderate**[f]	Identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on default.
Adverse effects and other harms	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.

***The risk in the intervention group** (and its 95% CI) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: confidence interval; **LHW:** lay health worker; **MD:** mean difference; **MUAC:** mid-upper arm circumference; **RCT:** randomised controlled trial; **RR:** risk ratio; **WHZ:** weight-for-height Z-score.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[a] Downgraded one level for serious risk of bias (recovery criteria included subjective criterion of child being "clinically well", and there was no blinding of outcome assessors) and one level for serious imprecision (95% CI crosses the null value, and the effect ranges from trivial harm to small benefit).
[b] Downgraded one level for serious risk of bias (recovery criteria included subjective criterion of child being "clinically well", and there was no blinding of outcome assessors) and one level for serious imprecision (although 95% CI does not the null value, the effect ranges from moderate to trivial harm).
[c] Downgraded one level for serious risk of bias (recovery criteria included subjective criterion of child being "clinically well", and there was no blinding of outcome assessors) and one level for serious imprecision (although 95% CI does not the null value, the effect ranges from trivial to moderate harm).
[d]Downgraded two levels for very serious imprecision (95% CI crosses the null value, and the effect ranges from substantial harm to very substantial benefit).
[e]Downgraded one level for serious imprecision (95% CI crosses the null value, and the effect ranges from trivial benefit to moderate harm).
[f] Downgraded one level for serious imprecision (95% CI crosses the null value, and the effect ranges from trivial benefit to small harm).
[g] Downgraded one level for serious imprecision (95% CI crosses the null value, and the effect ranges from small benefit to small harm).
[h]Downgraded two levels for very serious imprecision (95% CI crosses the null value, and the effect range includes important differences from the point estimate for mortality).

Summary of findings 2. Summary of findings – Non-randomised controlled trials

Summary of findings
Identification or treatment by lay health workers compared to health professionals for wasting in children
Patient or population: children aged > 6 months and < 5 years with wasting **Setting:** Malawi (Linneman 2007[a]), Mali (Alvarez Moran 2018[b]), Mauritania (Charle-Cuellar 2021[c]), Niger (Ogobara Dougnon 2021[d]), Tanzania (Wilunda 2021[e])

Intervention: identification and treatment by LHWs or health professionals (Alvarez Moran 2018[b]; Charle-Cuellar 2021[c]; Ogobara Dougnon 2021[d]) or identification and treatment by LHWs (Linneman 2007[a]; Wilunda 2021[e])

Comparison: treatment by health professionals following self-referral (Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021), or following screening and identification by LHWs (Alvarez Moran 2018; Wilunda 2021)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	Number of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with health professionals	Risk with LHWs				
Anthropometric recovery Defined as: WHZ ≥ −1.5 or MUAC > 125 mm for 2 consecutive visits and absence of nutritional oedema for 14 days (Alvarez Moran 2018[b]); absence of oedema and WHZ ≥ −1.5 or MUAC > 125 mm (Charle-Cuellar 2021[c]; no oedema and weight-for-height > 85% (Linneman 2007[a]) no oedema for 14 days and WHZ ≥ −2 or MUAC ≥ 125 mm (Ogobara Dougnon 2021[d]); MUAC ≥ 125 mm (Wilunda 2021[e])	811 per 1000	859 per 1000 (811 to 900)	**RR 1.06** (1.00 to 1.11)	6688 (5 observational studies)	⊕⊖⊖⊖ **Very low**[f]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on anthropometric recovery in children with moderate or severe wasting.
Non-response to treatment Defined as: not achieving weight-for-height > 85% of ideal or relapse requiring inpatient treatment (Linneman 2007)[a]; persistent oedema at 21 days or no weight gain in 2 consecutive visits (Ogobara Dougnon 2021)[d]; not meeting discharge criteria after 3 months' treatment (Wilunda 2021)[e]	41 per 1000	53 per 1000 (38 to 73)	**RR 1.29** (0.93 to 1.78)	3807 (3 observational studies)	⊕⊖⊖⊖ **Very low**[g]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on non-response to treatment in children with wasting.
Sustained recovery	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Anthropometric outcomes: total MUAC gain Defined as MUAC at discharge − MUAC on admission among children with	The median total MUAC gain was 11.0 mm	**Median 2 mm higher** (0 to 0)	—	532 (1 observational study)	⊕⊖⊖⊖ **Very low**[h]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on to-

no oedema and discharged as cured (Charle-Cuellar 2021)[c]						tal MUAC gain in children with severe wasting.
Anthropometric outcomes: MUAC gain per day Defined as (discharge MUAC − admission MUAC)/days in treatment among children with no oedema and discharged as cured (Charle-Cuellar 2021)[c]	The median MUAC gain per day was 0.27 mm	**Median0.02 mm/day higher** (0 to 0)	—	531 (1 observational study)	⊕⊖⊖⊖ **Very low**[i]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on MUAC gain per day in children with severe wasting.
Anthropometric outcomes: total weight gain (g/kg) Defined as (weight at discharge − weight on admission)/weight on admission among children with no oedema and discharged as cured (Charle-Cuellar 2021)[c]	The median total weight gain was 197.2 g/kg	**Median 12.5 g/kg higher** (0 to 0)	—	517 (1 observational study)	⊕⊖⊖⊖ **Very low**[j]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on total weight gain (g/kg) in children with severe wasting.
Anthropometric outcomes: mean weight gain per day (g/kg/d) Defined as ((discharge weight − admission weight)/admission weight)/days in treatment (Wilunda 2021)[e]	The mean weight gain per day was 6.4 g/kg/d	**MD 0.00 g/kg/day** (0.89 lower to 0.89 higher)	—	343 (1 observational study)	⊕⊖⊖⊖ **Very low**[k]	The evidence is very uncertain about the effect of treatment by LHWs compared with treatment by health professionals on mean weight gain per day in children with severe wasting.
Anthropometric outcomes: median weight gain per day (g/kg/d) Defined as ((discharge weight − admission weight)/weight on admission)/days on treatment among children with no oedema and discharged as cured (Charle-Cuellar 2021)[c]	The median weight gain per day was 4.68 g/kg/d	**Median 0.05 g/kg/day higher** (0 to 0)	—	517 (1 observational study)	⊕⊖⊖⊖ **Very low**[l]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on median weight gain per day in children with severe wasting.
Relapse	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Deterioration to severe wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Transfer to inpatient care	40 per 1000	56 per 1000 (41 to 78)	**RR 1.42** (1.04 to 1.95)	4739 (4 observational studies)	⊕⊖⊖⊖ **Very low**[m]	The evidence is very uncertain about the effect of treatment by LHWs or health profession-

Defined as referral for: presence of danger signs and failed appetite test on first day of treatment (Alvarez Moran 2018)[b]; appearance of severe signs of illness, persistent oedema, absence of weight gain in non-oedematous children, or weight loss (Charle-Cuellar 2021)[c]; appearance of severe medical complications or loss of appetite (Ogobara Dougnon 2021)[d]; development of medical complications, oedema, weight loss or appetite loss, or static weight on 3 consecutive visits, or request by caregiver (Wilunda 2021)[e]						als, compared with treatment by health professionals only, on transfer of children with severe wasting to inpatient care.
Mortality among children with wasting	15 per 1000	13 per 1000 (8 to 21)	**RR 0.89** (0.56 to 1.44)	6688 (5 observational studies [a, b, c, d, e])	⊕⊖⊖⊖ **Very low**[n]	The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on mortality among children with wasting.
Appropriate identification of children with wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Appropriate identification of children with oedema	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Appropriate referral of children with moderate or severe wasting	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Treatment coverage Defined as proportion of children with SAM who receive treatment (number of children treated from baseline to endline; Wilunda 2021)[e]	417 per 1000	808 per 1000 (675 to 967)	**RR 1.94** (1.62 to 2.32)	445 (1 observational study)	⊕⊖⊖⊖ **Very low**[o]	The evidence is very uncertain about the effect of treatment by LHWs, compared with treatment by health professionals only, on treatment coverage in children with severe wasting.
Caregiver adherence to care plans	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.
Default from care	99 per 1000	56 per 1000 (40 to 81)	**RR 0.57** (0.40 to 0.82)	6688	⊕⊖⊖⊖ **Very low**[p]	The evidence is very uncertain about the effect of treatment

	Defined as: absence on 2 follow-up visits (Charle-Cuellar 2021[c]; Linneman 2007[a]); absence on 2 consecutive visits (Alvarez Moran 2018[b]; Ogobara Dougnon 2021[d]); absence on 3 consecutive visits (Wilunda 2021[e])			(5 observational studies)		by LHWs or health professionals, compared with treatment by health professionals only, on default in children with wasting.
Adverse effects and other harms	See comment	See comment	See comment	See comment	See comment	No studies assessed this outcome.

*__The risk in the intervention group__ (and its 95% CI) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **MD:** mean difference; **MUAC:** mid-upper arm circumference; **RCT:** randomised controlled trial; **RR:** risk ratio; **SAM:** severe acute malnutrition; **WHZ:** weight-for-height Z-score.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

[a] Linneman 2007: LHWs treated all the children in the intervention arm.
[b] Alvarez Moran 2018: LHWs treated 79.0% of children in the intervention arm, and health professionals treated the rest.
[c] Charle-Cuellar 2021: LHWs treated 20.7% of children in the intervention arm, and health professionals treated the rest.
[d] Ogobara Dougnon 2021: LHWs treated 39.2% of children in the intervention arm, and health professionals treated the rest.
[e] Wilunda 2021: LHWs treated all children in the intervention arm.
[f] Downgraded one level for serious risk of bias (all 5 studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics; Alvarez Moran 2018, Linneman 2007 and Ogobara Dougnon 2021 were at high risk of bias due to unequal baseline outcomes; Charle-Cuellar 2021 was at high risk of bias due to attrition; and all 5 studies were at high overall risk of bias), one level for serious inconsistency (I^2 = 74%) and one level for serious imprecision (95% CI crosses the null value, and the effect ranges from trivial harm to small benefit).
[g] Downgraded two levels for very serious risk of bias (all 3 studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics; Ogobara Dougnon 2021 was at high risk of bias due to unequal baseline outcomes; Charle-Cuellar 2021 had high risk of bias due to attrition; and all 3 studies were at high overall risk of bias) and one level for serious imprecision (95% CI crosses the null value, and the effect ranges from trivial benefit to moderate harm).
[h] Downgraded one level for serious risk of bias (Charle-Cuellar 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment, unequal baseline characteristics and attrition) and one level for serious imprecision (the interquartile ranges of the 2 groups overlap (9.0 to 16.0 for intervention; 8.0 to 15.0 for control).
[i] Downgraded one level for serious risk of bias (Charle-Cuellar 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment, unequal baseline characteristics and attrition) and one level for serious imprecision (the interquartile ranges of the 2 groups overlap (0.20 to 0.43 for intervention; 0.17 to 0.41 for control).
[j] Downgraded one level for serious risk of bias (Charle-Cuellar 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment, unequal baseline characteristics and attrition) and one level for serious imprecision (the interquartile ranges of the 2 groups overlap (164.6 to 255.2 for intervention; 157.9 to 254.3 for control).
[k] Downgraded one level for serious risk of bias (Wilunda 2021 had high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics).
[l] Downgraded one level for serious risk of bias (Charle-Cuellar 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment, unequal baseline characteristics and attrition) and one level for serious imprecision (the interquartile ranges of the 2 groups overlap (3.39 to 7.35 for intervention; 3.17 to 7.11 for control).

[m] Downgraded one level for serious risk of bias: all 4 studies had high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics; Charle-Cuellar 2021 had high risk of bias due to attrition in outcome assessment; and all 4 studies had high overall risk of bias).

[n] Downgraded one level for serious risk of bias (all 5 studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics; Charle-Cuellar 2021 was at high risk of bias due to attrition; and all 5 studies were at high overall risk of bias) and one level for serious imprecision (95% CI crosses the null value, and the effect range includes appreciable differences from the point estimate for mortality).

[o] Downgraded one level for serious risk of bias (Wilunda 2021 was at high overall risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics).

[p] Downgraded one level for serious risk of bias (all 5 studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics; Charle-Cuellar 2021 was at high risk of bias due to attrition; and all 5 studies were at high overall risk of bias), and one level for serious inconsistency (I^2 = 63%).

BACKGROUND

In 2015, member countries of the United Nations (UN) committed to the Sustainable Development Goals (SDGs), which included eliminating malnutrition in all its forms by 2030 (Moyer 2020). The SDGs incorporated the World Health Assembly targets to reduce the proportion of children suffering from wasting to less than 5% by 2025 and less than 3% by 2030. However, since these targets were adopted, there has been little change in the proportion of wasted children.

Putting in place adequate human resources for health is considered key to achieving the health-related SDGs (Farrenkopf 2019; WHO 2016). However, many countries have significant shortages of professional health workers and important inequities in their distribution across settings. These concerns underlie efforts to develop and expand the role of lay health workers (LHWs) in widening service coverage, particularly in more remote areas and for 'hard to reach' groups (Gopinathan 2014; Hodgins 2021; Perry 2020; WHO 2020). LHWs, defined as members of the community who have received some training to promote health or to carry out some healthcare services but who are not healthcare professionals (Lewin 2005), have been effective in promoting some aspects of child health. For instance, compared to usual care, use of LHWs may help improve the uptake of childhood immunisation and breastfeeding, decrease child morbidity and mortality, and increase the likelihood of care-seeking for childhood illness (Lewin 2010). This cadre can take on tasks previously within the remit of health professionals, with the aim of improving access to key effective health interventions and making the most efficient use of available human resources for health (Afriyie 2019; Asamani 2019; WHO 2012; WHO 2020). In 2018, the World Health Organization (WHO) published a guideline on health policy and system support to optimise these programmes (WHO 2018).

In this review, we aimed to synthesise the available evidence on whether LHWs working in community settings could effectively identify and treat moderate and severe wasting in children aged five years or under, compared with health providers working in health facilities.

In the literature, the term lay health worker (LHW) is used interchangeably with the term community health worker (CHW); we chose to use LHW throughout this review.

Description of the condition

Wasting, stunting, and being underweight are the three subforms of child undernutrition. According to WHO, wasting (or acute malnutrition) refers to a child who is too thin for his or her height, stunting to a child who is too short for his or her age, and underweight to a child who is too thin for his or her age (WHO 2021).

Wasting in children aged five years or younger may be categorised as moderate or severe according to clinical measures. These measures include the deviation of their weight-for-height from the mean of the WHO Child Growth Standards (weight-for-height Z-score; WHZ), the mid-upper arm circumference (MUAC), and the presence of bilateral oedema (UNICEF 2009; see Table 1).

Wasting in children is the life-threatening result of poor nutrient intake, disease, or both. Children suffering from wasting have weakened immunity, are susceptible to long-term developmental delays, and face an increased risk of death, particularly when wasting is severe. These children require urgent feeding, treatment, and care to survive.

When efforts to prevent malnutrition fall short, early detection and treatment of children with wasting and other life-threatening forms of malnutrition are critical to saving their lives and putting them on the path to healthy growth and development. Children with severe acute malnutrition (SAM) are currently treated with special therapeutic foods, most commonly ready-to-use therapeutic food (RUTF) or F75 and F100 milk-based diets (Schoonees 2019).

In 2019, 47.0 million children aged five years or under were wasted, of whom 14.3 million were severely wasted. More than 90% of all wasted children lived in low- or lower-middle-income countries. More specifically, more than two-thirds (69%) of all wasted children aged five years or under lived in Asia (69%), and more than one-quarter (27%) lived in Africa (UNICEF 2020).

Description of the intervention

Since the early 2010s, significant improvements have been made in the capacity to effectively treat children with wasting. Since the introduction of outpatient interventions for wasting in 2007, treatment services to address severe wasting have been integrated into the national health systems of over 70 countries worldwide. These services include the community-based management of acute malnutrition (CMAM) model, which enables LHWs to diagnose children with uncomplicated wasting in the community and refer them to an outpatient therapeutic feeding programme at health centres. However, of all children with wasting in need of treatment, the proportion who receive this treatment is still low: an estimated two out of every three children with severe wasting are still unable to access the care they need (UNICEF 2020).

In the 2000s, the United Nations Children's Fund (UNICEF) and WHO introduced the integrated community case management (iCCM) approach to improve uptake of services in areas with poor access to facility-based health services. The iCCM approach is based on training LHWs to provide selected screening, identification, and curative services, mainly to diagnose and treat diarrhoea, malaria, and pneumonia in children aged two months to 59 months (Oliphant 2021; Young 2012). Compared with usual facility services, iCCM delivered by LHWs probably increases coverage of care-seeking from an appropriate provider for any iCCM illness (Oliphant 2021).

In November 2021, the UN Agencies working on the prevention of child wasting (the Food and Agriculture Organization of the UN (FAO), the Office of the High Commissioner for Refugees (UNHCR), UNICEF, the World Food Programme (WFP), and WHO) developed a Framework for the Global Action Plan (GAP) on Child Wasting. They identified that strengthening health systems and integrating treatment into routine primary health services are core pathways towards the goal of increasing coverage of treatment services for children with wasting by 50% by 2025. Among the set priorities for this goal is to increase the capacity of LHWs to identify and, whenever possible, treat children with uncomplicated wasting and monitor their nutritional rehabilitation at home (FAO 2020).

How the intervention might work

Nutritional rehabilitation of children with moderate or severe wasting typically takes weeks to months (Teshome 2019). Care

in the community may be more accessible and acceptable to caregivers, and less costly than care in health facilities. The iCCM approach to childhood malnutrition could improve access to care by bringing effective therapies to children with wasting, rather than relying on caregivers to bring the children to health facilities for treatment.

Why it is important to do this review

Despite the opportunity to enhance access to care through iCCM programmes, estimates of global and regional child malnutrition by UNICEF, WHO, and the World Bank indicate that malnutrition remains a major concern. These joint estimates, published in March 2020, cover indicators of stunting, wasting, severe wasting, and overweight among children aged five years or under, and reveal insufficient progress to reach the World Health Assembly targets set for 2025, and the SDGs set for 2030 (UNICEF 2021). In response, WHO is developing a new guideline on the prevention and treatment of wasting in infants and children, which will update certain current recommendations. This review was requested and funded by the Food and Nutrition Action in Health Systems Unit of WHO as part of the compilation of evidence to inform the guideline.

OBJECTIVES

To assess the effectiveness of identification and treatment of moderate and severe wasting in children aged five years or under by lay health workers working in the community compared with health providers working in health facilities.

METHODS

Criteria for considering studies for this review

Types of studies

We included randomised controlled trials (RCTs) and non-randomised studies with individual or cluster allocation. In studies with a cluster design, there may be similarities among participants in the same cluster, which can lead to a correlation of observations within the clusters. If trial authors ignore clustering and analyse clustered studies as studies with individual allocation, they may reach false conclusions (artificially narrow confidence intervals (CIs)). Data reporting and analysis at the level of the individual in clustered studies is a common problem (also known as a unit of analysis error; Higgins 2022). To avoid this issue, we analysed clustered studies with fewer than two groups (clusters) per arm as non-randomised studies (EPOC 2017a).

We included all eligible studies irrespective of their publication status, publication year, or publication language.

We excluded controlled trials with only one group in either arm, controlled before-after studies, interrupted time series (controlled or uncontrolled), repeated measures studies, cohort studies, and studies that used retrospective controls, owing to the serious risk of bias associated with these study designs.

Types of participants

We included children aged five years or younger with moderate or severe wasting. If feasible, we aimed to analyse data by age group (birth to six months, six to 23 months, 24 to 59 months).

We defined moderate wasting (also described as moderate acute malnutrition (MAM) in the literature/programmatic documents) as:

- WHZ below −2 but no lower than −3; or
- MUAC below 125 but no lower than 115 mm (in children aged six months to 59 months); and
- no nutritional oedema (WHO 2009).

We defined severe wasting (also described as SAM in the literature/programmatic documents) as:

- WHZ below −3; or
- MUAC below 115 mm (in children aged six months to 59 months); and
- nutritional oedema (WHO 2009).

We documented any comorbidities or medical complications during data extraction, and we considered the term comorbidities equivalent to medical complications or with complicated wasting/SAM/MAM.

Most current national treatment protocols indicate that wasted children with specific medical complications or comorbidities need a referral to a health facility. At the health facility, wasted children will either be treated as an outpatient or referred for inpatient care according to the degree of wasting and the specific medical complications or comorbidities.

We excluded studies in populations that were primarily stunted or malnourished without wasting. However, we included studies with concurrent wasting and stunting, provided that at least half of the children had wasting. We also included studies that recruited low birth weight babies at the start of the trial, provided they met all other inclusion criteria.

Types of interventions

Healthcare providers

We included studies where the intervention was delivered by LHWs working on a paid or voluntary basis. For this review, we defined LHW as any health worker who performed functions related to any aspect of healthcare delivery (including health promotion, screening, and treatment provision and support) and who had received some form of training in the context of the intervention, but had received no formal professional certificate or tertiary education degree. LHWs could have some certification but could not be registered with a certifying body for health professionals.

Where available, we extracted data on the following characteristics of the LHWs in each study.

- Level of education (none, primary school, etc.)
- Duration of training received and type and level of supervisory support
- Where they were based (community, health facility, other)
- The range of tasks they were responsible for
- Incentives they received

We did not consider formally trained social workers, nutritionists, nurse aides, medical assistants, physician assistants, paramedical workers in emergency and fire services, or other self-defined health professionals or health paraprofessionals.

We excluded interventions in which the LHW was a family member trained to deliver care and provide support only to members of his or her own family (i.e. where LHWs did not provide some sort of care or service to others or were unavailable to other members of the community). We regarded these interventions as qualitatively different from other LHW interventions included in this review, given that family members have an established close relationship with those receiving care, which could influence the process and effects of the intervention.

Interventions

We considered studies that described any of the following interventions.

- Intervention 1: identification by LHWs (in community settings) of children with wasting, following the same criteria for identification of wasting as in the comparison group
- Intervention 2: identification by LHWs (in community settings) of children with wasting and medical complications needing referral for inpatient care, following the same criteria for identification of wasting and for programme admission and discharge as in the comparison group
- Intervention 3: identification and treatment by LHWs (in community settings) of children with wasting but no medical complications needing referral, following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the comparison group

The following interventions were ineligible.

- Primary prevention of malnutrition in the community by LHWs
- Interventions by LHWs for children with micronutrient deficiencies or anaemia, unless these children also had moderate or severe wasting

Comparators

Eligible studies used one of the following comparators.

- Comparator 1: identification and treatment of wasting by health professionals such as nurses or doctors (at health facilities), following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the intervention group.
- Comparator 2: identification and treatment of wasting by health facility-based teams, including health professionals and LHWs, following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the treatment group.

Where the comparator was described as 'usual care' or 'standard treatment', we extracted any available details of this care.

We excluded studies that compared LHW screening with screening by parents (e.g. where parents were trained to screen through women's groups in their village) and 'head-to-head' comparisons of different LHW interventions, such as studies that compared LHWs receiving different types of supervision.

Types of outcome measures

We extracted outcomes addressing the following categories, in accordance with the outcomes prioritised by the WHO Guideline Development Group for the guideline process to which this review contributed.

- Healthcare outcomes
- Quality of care
- Health behaviours
- Harms or adverse effects

We excluded studies that measured only recipients' knowledge, attitudes, or intentions, and we did not extract these data from included studies, as we did not consider them useful indicators of the effectiveness of LHW interventions. In addition, we collected information for two additional outcomes that were not predefined in the original protocol, namely 'default rate' and 'transfer to another lay health worker site or health facility', as several included studies reported these outcomes, and we considered that they provided important information for the progress of treatment.

Primary outcomes

Appendix 1 explains the importance of our selected outcomes, as judged by the WHO Guideline Development Group for which this review was commissioned.

Healthcare outcomes

- Anthropometric recovery, as defined by each study. We used this approach for the following reasons.
  - The definition of anthropometric recovery is likely to be determined by nutritional/CMAM protocols in the study setting.
  - A wasted child is usually categorised as anthropometrically recovered (and hence discharged from a nutritional programme) when their MUAC is above 125 mm (in children aged six months to 59 months) or their WHZ is above −2 and they have no oedema for at least two weeks. Any additional clinical criteria used are unlikely to be standardised but were documented.
  - Ideally, children should be discharged based on the same criteria as those for admission (e.g. a child admitted based on MUAC must be discharged based on MUAC); this was documented for each study.
- Non-response (e.g. not achieving recovery within four months of initiating treatment)
- Sustained recovery (e.g. nutritional recovery sustained for at least six months)
- Anthropometric outcomes (WHZ, weight-for-age Z-score (WAZ), MUAC, change in anthropometry, weight gain)
- Relapse (e.g. wasting within six months after discharge)
- Deterioration to severe wasting
- Mortality among children with wasting/severe wasting

Quality of care

- Appropriate identification of children with moderate or severe wasting
- Appropriate identification of children with oedema
- Appropriate referral of children with moderate or severe wasting

- Treatment coverage: the number of children with (severe) wasting who received treatment as a proportion of the total number of children with (severe) wasting in the catchment area. This may be estimated using either the Semi-Quantitative Evaluation of Access and Coverage (SQUEAC) methodology or Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage (SLEAC) methodology, which take into account the recovering cases of (severe) wasting both within and outside the treatment programme or intervention (see Alvarez Moran 2018).

Health behaviours

- Caregivers' adherence to care plans provided by LHWs or health professionals.

Harms or adverse effects

- Any harms or adverse effects not captured in the outcomes above.

Secondary outcomes

This review had no secondary outcomes.

Search methods for identification of studies

Electronic searches

We searched the Epistemonikos database, Epistemonikos Foundation (www.epistemonikos.org/) for related systematic reviews on 24 September 2021.

We searched the following electronic databases for primary studies on 24 September 2021.

- MEDLINE ALL (Ovid; 1946 to 23 September 2021)
- Cochrane Central Register of Controlled Trials (CENTRAL; 2021, Issue 9), in the Cochrane Library (searched 24 September 2021)
- CINAHL, EBSCO (Cumulative Index to Nursing and Allied Health Literature; 1980 to 23 September 2021)
- Global Index Medicus, WHO (www.globalindexmedicus.net/)

See Appendix 2 for all search strategies.

Searching other resources

In addition, we searched the following trial registries on 24 September 2021.

- WHO International Clinical Trials Registry Platform (ICTRP; trialsearch.who.int)
- US National Institutes of Health (NIH) Ongoing Trials Register ClinicalTrials.gov (www.clinicaltrials.gov)

We also checked studies included in a wider LHW review for relevant studies (Pantoja 2022), and we screened articles recommended by nutrition consultants from the WHO Food and Nutrition Action in Health Systems Unit (our partner in this review) and by authors we had contacted.

Data collection and analysis

This review is an update of a component of an earlier published Cochrane Review (Lewin 2010). The review methods draw on a generic protocol for updating the earlier Cochrane Review (Pantoja 2022).

Review authors independently screened and selected the studies. EP and YCL independently extracted the data, YCL and WYC independently conducted the risk of bias assessments, KD performed the meta-analysis, and all review authors independently conducted the GRADE assessment.

Selection of studies

Review authors screened all records obtained from the searches using Covidence systematic review software (Covidence). Two review authors independently screened all titles and abstracts to exclude those that were clearly ineligible, consulting a third review author in case of any disagreement. We retrieved full-text copies of all articles identified as potentially relevant by at least two review authors. Two review authors independently checked each full paper against our inclusion criteria. We resolved any disagreements by team discussion. If we were unable to reach an agreement, or it was unclear whether the study met the PICO requirements, we consulted the WHO nutrition consultants (AD, KP).

Where appropriate, we contacted the study authors for further information.

As all studies retrieved were in English, no translations were necessary.

We listed studies excluded at the full-text review stage in the Characteristics of excluded studies table. We collated multiple reports of the same study so that each study rather than each report was the unit of interest in the review. We also provided any information we could obtain about ongoing studies. We recorded the selection process in sufficient detail to complete a PRISMA flow diagram (Page 2021).

No review authors were involved in the conduct, analysis, or publication of any study that could be included in the review.

Data extraction and management

We extracted the data using a standardised data collection form (EPOC 2017a).

Assessment of risk of bias in included studies

Two review authors (YCL, WYC) independently assessed each included study for risk of bias using the criteria outlined in Chapter 8 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2022), and guidance from the EPOC group (EPOC 2017b).

Randomised controlled trials

For cluster-RCTs, we used the Cochrane risk of bias tool (RoB 2) assessment template for cluster-randomised trials, which contains the following domains.

- Domain 1: bias arising from the randomisation process
- Domain 1b: bias arising from timing of identification or recruitment of participants
- Domain 2: bias due to deviations from intended interventions
- Domain 3: bias due to missing outcome data
- Domain 4: bias in measurement of the outcome
- Domain 5: bias in selection of the reported result
- Overall bias

Had we included any individually randomised trials, we would have used the RoB 2 assessment template for randomised trials, which contains all the same domains as the cluster-RCT template except domain 1b.

We judged each potential source of bias as 'high risk', 'low risk', or 'unclear'. We provided a quote from the study report and justified our judgement in the risk of bias tables for each study's outcome. We considered baseline outcome, blinding, missing or incomplete outcome data, and bias in the selection of the reported result/ selective outcome reporting separately for different key outcomes where necessary (e.g. risk of bias related to unblinded outcome assessment may be very different for all-cause mortality versus a participant-reported pain scale). We assigned an overall risk of bias judgement (high, some concerns, or low) to each included study outcome using the approach suggested in Chapter 8 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2022). We considered studies with a low risk of bias for all key domains, or where it seemed unlikely for bias to seriously alter the results, to be at low overall risk of bias. We considered studies where the risk of bias in at least one domain was unclear, or which had some bias that could plausibly raise doubts about the conclusions, to have some concerns about overall risk of bias. We considered studies with a high risk of bias in at least one domain, or that we judged to have a serious bias that decreased the certainty of the conclusions, to be at high overall risk of bias. We summarised the risk of bias judgements across different studies for each of the comparisons for all the domains listed. We did not exclude any studies on the grounds of their risk of bias, but we reported the risk of bias when presenting the results of the studies.

Non-randomised studies

For non-randomised designs, we used the EPOC risk of bias assessment template, which contains the following sections.

- Bias arising from the randomisation process
  - Random sequence generation
  - Allocation concealment
  - Differences in baseline characteristics
- Bias arising from the timing of identification or recruitment of participants
  - Differences in baseline outcomes
- Bias due to deviations from intended interventions
  - Blinding of participants and personnel
- Bias due to missing outcome data
  - Incomplete outcome data
- Bias in the measurement of the outcome
  - Blinding of outcome assessment
- Bias arising from lack of protection from contamination
- Bias in the selection of the reported result
  - Selective outcome reporting
- Bias arising from other sources
- Overall risk of bias.

We judged each potential source of bias as 'high risk', 'low risk', or 'unclear'. We provided a quote from the study report and justified our judgement in the risk of bias tables for each outcome. We considered baseline outcome, blinding, missing or incomplete outcome data, and bias in the selection of the reported result/ selective outcome reporting separately for different key outcomes where necessary (e.g. risk of bias related to unblinded outcome assessment may be very different for all-cause mortality versus a participant-reported pain scale). We assigned an overall risk of bias judgement (high, unclear, or low) to each included study outcome using the approach suggested in the EPOC group guidance (EPOC 2017b). We considered studies with a low risk of bias for all key domains, or where it seemed unlikely for bias to seriously alter the results, to have a low overall risk of bias. We considered studies where the risk of bias in at least one domain was unclear, or that we judged to have some bias that could plausibly raise doubts about the conclusions, to be at unclear risk of bias overall. We considered studies with a high risk of bias in at least one domain, or that we judged to have a serious bias that decreased the certainty of the conclusions, to have a high overall risk of bias. We summarised the risk of bias judgements across different studies for each of the comparisons for all the domains listed. We did not exclude any studies on the grounds of their risk of bias, but we reported the risk of bias when presenting the results of the studies.

We used the robvis visualisation tool to create figures of the risk of bias assessments for cluster-randomised and non-randomised trials (McGuinness 2021).

When assessing treatment effects during the GRADE process, we considered the risk of bias for the studies contributing to that outcome.

Measures of treatment effect

Measures of effect were calculated based on the type of data presented in the individual studies for specific outcomes. We used risk ratios (RRs) for dichotomous data, together with the appropriate associated 95% CI, and mean difference (MDs) or standardised mean difference (SMDs) for continuous data, together with the associated 95% CI (Higgins 2022).

We ensured that an increase in scores for continuous outcomes could be interpreted in the same way for each outcome, with an explanation of the direction.

Unit of analysis issues

For studies that allocated groups of participants (e.g. by village), we took into account clustering during analysis to prevent unit of analysis errors. We considered that study authors had analysed data appropriately if they had:

- conducted the analysis at the same level as the allocation (i.e. at the cluster level);
- used the usual analysis but reduced the sample size to its 'effective sample size' or inflated the variance by the design effect; or
- conducted the analysis at the level of the individual but performed appropriate statistical correction for clustering (e.g. generalised estimating equations (GEEs), mixed models, or multilevel models).

Where study authors had not analysed clustered studies appropriately, we adjusted for clustering following the method suggested in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2022). When study-specific intracluster correlation coefficients (ICCs) were unavailable, we obtained external estimates from similar studies. For all analyses, we used an ICC of 0.001, as reported in one included study (Hussain 2021).

For estimates with 95% CIs that did not cross the null value, we conducted a sensitivity analysis using a higher ICC (0.05).

We calculated relative risks and standard errors (SEs) for individually randomised trials and cluster-RCTs (unadjusted), then we then adjusted the SEs for cluster-RCTs for the effect of clustering using the multiplicative factor square root of the design effect (1 + (mean cluster size − 1) × ICC).

Dealing with missing data

We attempted to contact the study authors to obtain important missing information. Where necessary, we computed missing summary data from other reported statistics. Whenever we were unable to obtain data, we reported the level of missingness and considered how it might impact the certainty of the evidence.

Assessment of heterogeneity

We assessed clinical heterogeneity by preparing a table that summarised the study characteristics (types of participants, interventions, outcomes, and study design; Table 2). We also summarised intervention characteristics in the TIDiER format (Appendix 3). This allowed us to examine the similarity of the studies regarding relevant factors.

We conducted meta-analyses when the participants, interventions, comparisons, and outcomes were deemed sufficiently similar in studies that contributed data to the same outcome (Borenstein 2009). To measure statistical heterogeneity, we used the Chi^2 test and the I^2 statistic, considering an I^2 value of 50% or lower representative of low heterogeneity, and an I^2 value above 50% representative of high heterogeneity (Higgins 2022). If we identified substantial heterogeneity, we explored it by prespecified subgroup analysis.

Assessment of reporting biases

We attempted to minimise reporting bias by:

- including both published and unpublished studies;
- in the case of studies with multiple publications, extracting data on outcomes from the publication with the most mature data;
- applying no search restrictions related to publication language or year; and
- contacting study authors to request missing outcome data.

Where this was not possible, and missing data were thought to introduce serious bias, we explored the impact of including such studies in the overall assessment of results.

As we identified fewer than 10 trials for synthesis, we did not create funnel plots to explore possible publication bias (Sterne 2011).

Data synthesis

We performed meta-analyses for outcomes with sufficient data for pooling (Borenstein 2009), analysing randomised and non-randomised trials separately in accordance with the guidance provided in section 24.2.2 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2022).

For trials with multiple trial arms, we only included the relevant arms in our analyses.

As we anticipated important heterogeneity, we used a random-effects meta-analysis. We combined the effect estimates using the generic inverse variance method in Review Manager 2014. For non-randomised cluster trials that had not adjusted appropriately for clustering, we extracted the raw estimates then adjusted for clustering, as described in Unit of analysis issues. For meta-analyses that included these non-randomised trials, ideally we should have used confounder-adjusted estimates. However, since these estimates had to be adjusted for clustering, and this required use of the raw data, we were unable to adjust for confounders.

Where there were insufficient data for meta-analysis, we summarised the results narratively using the relevant guidance (Campbell 2020).

Subgroup analysis and investigation of heterogeneity

There were insufficient data and studies to perform any subgroup analyses based on sample size (e.g. large versus small studies) or study setting (all studies were set in low-income countries).

We reported any deviations from the protocol in the Differences between protocol and review section.

Sensitivity analysis

To assess the robustness of our conclusions, we performed sensitivity analyses for results that showed important effects, using a higher ICC of 0.05 to explore impacts on the CIs around these estimates.

Stakeholder consultation and involvement

We partnered with the WHO Food and Nutrition Action in Health Systems Unit, which requested and funded this systematic review to help inform a new WHO guideline on the prevention and treatment of wasting in infants and children. The Guideline Development Group established by WHO for this guideline, which includes researchers and practitioners in the field of child wasting, decided on the participants, interventions, comparators, and outcomes (PICO) for the review. This process included the ranking of outcomes into 'critical' (highest importance), 'important', and 'not important' for the purposes of the guideline. Appendix 1 presents the details of this ranking. In addition, the WHO Unit provided consultation support during the study selection and data analysis stages of this review. The involvement of stakeholders is consistent with good practice and helps to address stakeholders' needs, reduce research waste, and improve the translation of research into policy and practice (CCN 2018; Pollock 2018).

Summary of findings and assessment of the certainty of the evidence

The review team assessed the certainty of the evidence (high, moderate, low, or very low) based on the five GRADE considerations (risk of bias, consistency of effect, imprecision, indirectness, and publication bias; Guyatt 2008) using GRADEpro software (GRADEpro GDT). We applied the methods and recommendations provided in Chapter 14 of the *Cochrane Handbook for Systematic Reviews of interventions* (Higgins 2022), and the EPOC worksheets (EPOC 2017c). We resolved any disagreements on certainty ratings by discussion. We used plain language statements to report these findings in the review (EPOC 2017c). Appendix 1 presents the GRADE profile for each intervention comparison. We summarised the findings for each intervention comparison and included the

primary outcomes and the certainty of the evidence in the Effects of interventions section of the text.

We summarised our findings in summary of findings tables for the main intervention comparisons, with footnotes explaining our decisions to downgrade or upgrade the certainty of the evidence. During the review process, if we became aware of an important outcome that we had not listed in our planned summary of findings tables, we included the relevant outcome and explained the reasons for the deviation from our protocol in the Differences between protocol and review section.

For outcome data that could not be meta-analysed, we summarised the results narratively and stated whether they supported or contradicted the meta-analysis findings

RESULTS

Description of studies

Results of the search

Figure 1 summarises the study selection process in a flow diagram. We imported 2126 records into EndNote for screening. After removing 443 duplicates, we screened the titles and abstracts of 1683 records, excluding 1529. We retrieved and assessed the full-text articles of the remaining 154 records and excluded 146 (of which 12 were duplicates). The Characteristics of excluded studies table presents our justifications for excluding studies at full-text review stage. We identified three ongoing studies (Characteristics of ongoing studies), and we listed five studies as awaiting classification (Characteristics of studies awaiting classification).

Figure 1. PRISMA chart.

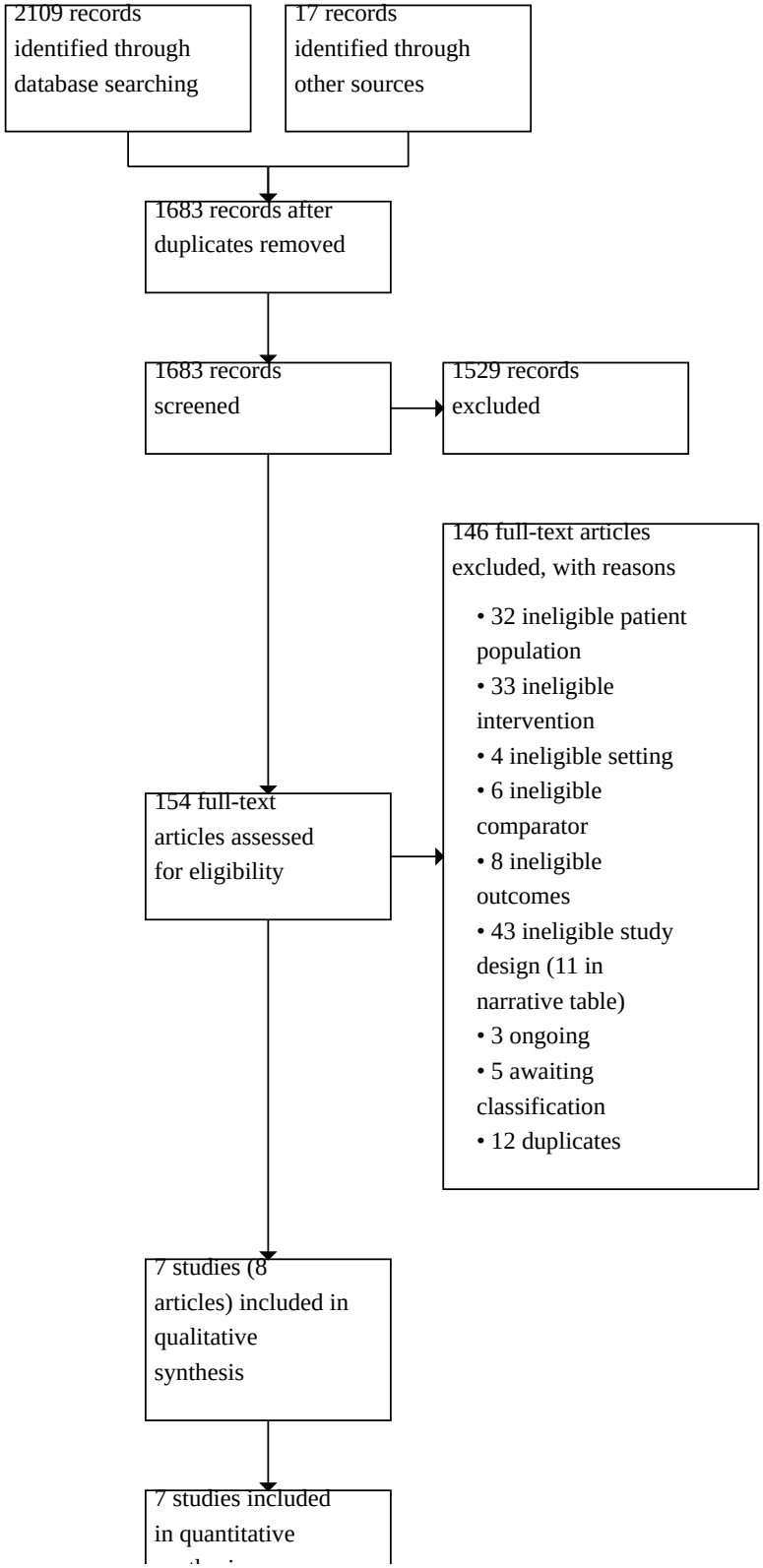


Figure 1. (Continued)

in quantitative synthesis (meta-analysis)

Included studies

We included seven studies in the quantitative synthesis: two were analysed as RCTs (Hussain 2021; Wroe 2021), and five as non-randomised studies (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). Lopez-Ejeda 2020 was a secondary analysis of Alvarez Moran 2018, so we included it together with Alvarez Moran 2018 in Table 2 and described its results narratively, without including it in any of the meta-analyses. Altogether, the studies recruited 38,197 children (934 in Alvarez Moran 2018, 869 in Charle-Cuellar 2021, 829 in Hussain 2021, 2937 in Linneman 2007, 2789 in Ogobara Dougnon 2021, 364 in Wilunda 2021, and 29,475 in Wroe 2021).

Population

One study included children aged six months to five years with MAM, defined as weight-for-height between 70% and 85% (Linneman 2007). Six studies included children aged six months to five years with SAM, based on the following criteria.

- MUAC below 115 mm (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Ogobara Dougnon 2021; Wilunda 2021)
- Oedema (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Ogobara Dougnon 2021; Wilunda 2021)
- WHZ below −3 (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021)
- Weight-for-height below 70% (Linneman 2007)

All six studies required children to have a good appetite and no medical complications requiring inpatient care.

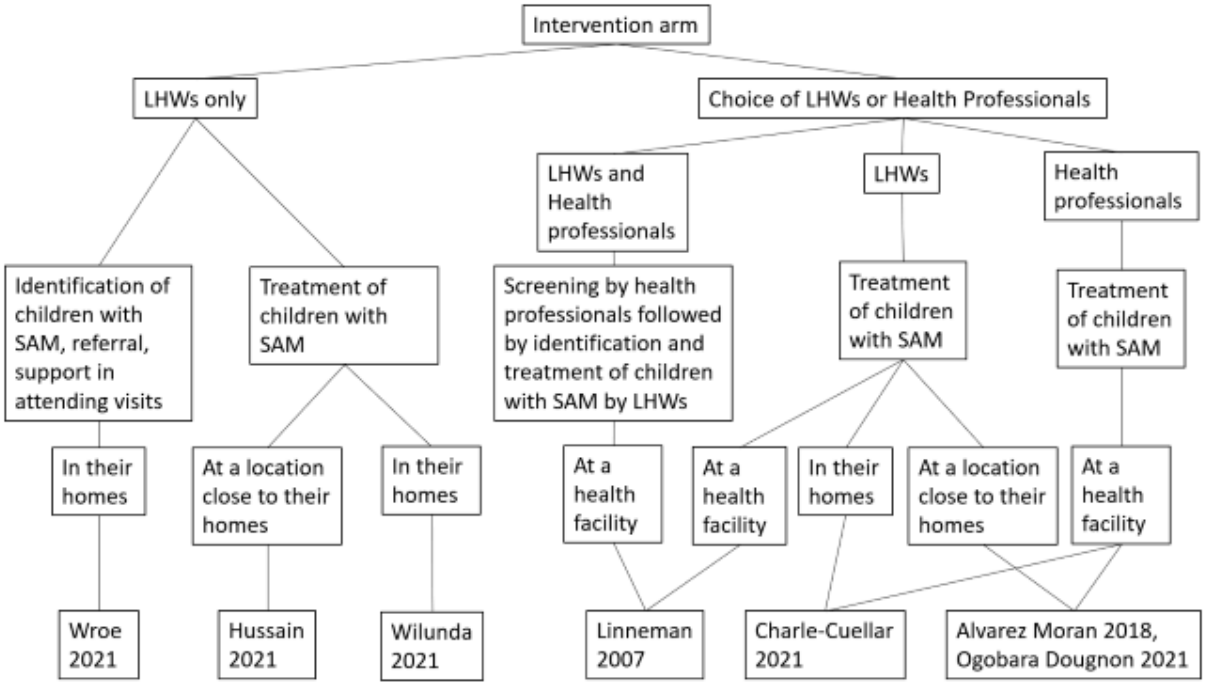
One study focused on the general population in a catchment area (Wroe 2021).

Six studies were conducted in Africa: two in Malawi (Linneman 2007; Wroe 2021), one in Mali (Alvarez Moran 2018), one in Mauritania (Charle-Cuellar 2021), one in Niger (Ogobara Dougnon 2021), and one in Tanzania (Wilunda 2021). One trial was conducted in Pakistan (Hussain 2021).

Interventions

We used the TIDiER table of intervention characteristics to summarise the interventions (Appendix 3). Figure 2 summarises the personnel and setting characteristics of the included intervention arms.

Figure 2. Summary of intervention personnel and settings in intervention arms of studies. LHW: lay health worker; SAM: severe acute malnutrition.



Intervention 1

One study assessed the effectiveness of identification by LHWs (in community settings) of children with wasting, following the same criteria for identification of wasting as in the comparison group (Wroe 2021). In this study, identification was followed by referral for treatment and support to attend clinic appointments.

Intervention 2

One study assessed the effectiveness of identification by LHWs (in community settings) of children with wasting and medical complications needing referral, following the same criteria for identification of wasting and for programme admission and discharge as in the comparison group (Wroe 2021).

Intervention 3

No studies assessed the effectiveness of identification and treatment by LHWs (in community settings) of children with wasting but no medical complications needing referral, following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the comparison group. However, six studies assessed the effectiveness of treatment by LHWs of children with wasting (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). No studies performed a separate analysis of the identification of wasting.

Intervention characteristics

In all seven studies, LHWs received initial training on paediatric malnutrition treatment (four days in Ogobara Dougnon 2021, five days in Wroe 2021, nine days in Hussain 2021, two weeks in Alvarez Moran 2018, three weeks in Charle-Cuellar 2021, one month in Linneman 2007, and an unspecified duration in Wilunda 2021). LHWs received refresher training in Alvarez Moran 2018 and Hussain 2021. Six studies reported supervision of LHWs (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Wilunda 2021; Wroe 2021). In four studies, LHWs received payment or incentives (Alvarez Moran 2018; Hussain 2021; Wilunda 2021; Wroe 2021).

Children in the intervention arm of three studies were offered either treatment by LHWs or health professionals in health facilities (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021). In Linneman 2007, one intervention arm offered treatment by LHWs alone, and one intervention arm offered identification and treatment by LHWs after screening by health professionals; our meta-analysis included only data from the participants treated by LHWs alone in that study. In two studies, the intervention arm offered identification and treatment by LHWs only (Hussain 2021; Wilunda 2021).

In three studies, LHWs conducted the intervention in participants' homes (Charle-Cuellar 2021; Wilunda 2021; Wroe 2021). In three studies, LHWs conducted the intervention at a community health facility close to participants' homes (locations close to participants' homes in Alvarez Moran 2018, health houses in Hussain 2021, and health huts in Ogobara Dougnon 2021). In one study, LHWs conducted the intervention in one of three pre-existing health facilities (two rural health centres and one mission hospital; Linneman 2007). In three studies, the intervention arm participants could receive the intervention from health professionals in health facilities rather than by LHWs at their sites (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021); of note, none of these studies specified how the children were allocated to one or the other type of care provider.

All six studies that investigated treatment by LHWs offered RUTF treatment and monitoring. Linneman 2007 monitored children every two weeks, and the other five studies provided weekly monitoring (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Ogobara Dougnon 2021; Wilunda 2021). At the start of the treatment, three studies provided antibiotics (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021), and two studies provided deworming treatment (Alvarez Moran 2018; Charle-Cuellar 2021). Other treatments included vitamin A (Alvarez Moran 2018), folic acid (Hussain 2021), and micronutrients (Linneman 2007). LHWs performed screening for wasting in children in the community during the study in Alvarez Moran 2018. LHWs counselled caregivers on infant and young child feeding practices in Hussain 2021.

Comparators

Comparator 1

The comparators in all seven studies were interventions administered by health professionals in health facilities, following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the intervention group. In three studies, the comparison arm involved LHWs screening children for malnutrition and referring them to health facilities for diagnosis and treatment (Alvarez Moran 2018; Hussain 2021; Wilunda 2021).

Comparator 2

No studies compared the intervention to identification and treatment of wasting by health facility-based teams, including healthcare professionals and LHWs, following the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols as in the treatment group.

Outcomes

Rate of recovery (termed "cure" in most studies) from SAM or MAM in children aged six months to 59 months was the primary outcome of six studies (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021), and a secondary outcome in Wroe 2021. Three studies assessed rate of non-response or failure of treatment (Charle-Cuellar 2021; Linneman 2007; Wilunda 2021). Anthropometric measures (weight gain, MUAC, WHZ, height) were outcomes of four studies (Hussain 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). Only Hussain 2021 assessed rate of relapse. Rate of deterioration (transfer to inpatient care) was an outcome of five studies (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Ogobara Dougnon 2021; Wilunda 2021). Six studies assessed mortality rate (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021), four studies assessed treatment coverage (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021; Wilunda 2021), six studies assessed default rate (Alvarez Moran 2018; Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021), and three studies assessed transfer rates to another health facility or LHW (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021).

No studies assessed rate of sustained recovery, appropriate identification of children with wasting or oedema, or appropriate referral of children with moderate or severe wasting.

The measurement time points were at the end of treatment (Charle-Cuellar 2021; Hussain 2021; Linneman 2007; Ogobara Dougnon 2021), at the time of discharge (Alvarez Moran 2018), or at the end of the trial (Wroe 2021).

Study design

We included two RCTs: Hussain 2021 was a cluster-randomised trial with three clusters in each arm, and Wroe 2021 was a stepped-wedge cluster-randomised trial with six clusters, one adopting the intervention every three months. Alvarez Moran 2018 randomised two clusters, one each to intervention and control; for this reason, we analysed it as a non-RCT together with the remaining four studies (Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021).

Contact with authors

We contacted the authors of Alvarez Moran 2018 to clarify the number of clusters in each arm, and they confirmed that each arm had one cluster. We contacted the authors of Ogobara Dougnon 2021 to clarify the number of internally transferred participants in the intervention group, and they informed us this number was 48. They also informed us that the number of deaths in the intervention group was 35, not 38 as reported.

Excluded studies

We excluded 138 studies: 32 had an ineligible study population (e.g. pregnant women and their newborns), 33 evaluated an ineligible intervention (e.g. measurement of MUAC by participants' mothers), four were conducted in an ineligible setting (e.g. treatment in a hospital or specialist clinic), six investigated an ineligible comparison (e.g. LHWs versus LHWs performing a variation of the intervention), eight assessed an ineligible outcomes (e.g. child's developmental score), 12 were duplicates, and 43 had an ineligible study design (e.g. cross-sectional survey, survey of knowledge and attitudes, retrospective study, prospective cohort study). See the Characteristics of excluded studies table for details.

Eleven excluded studies met all the inclusion criteria for this review except for study design (Adesoro 2021; Amthor 2009; Chanani 2019; Dani 2017; Goudet 2018; Kozuki 2020; Lal 1982; Puett 2013; Somasse 2013; Tandon 1984; Teshome 2019); we described their characteristics in an additional table (Table 3). Chanani 2019 and Goudet 2018 are summarised together in Table 3 as they described different outcomes from the same trial. Ten of these studies were ineligible for the review as they had repeated-measures (pre-post) single-group prospective cohort designs with no control or comparison group (Adesoro 2021; Amthor 2009; Chanani 2019; Dani 2017; Goudet 2018; Kozuki 2020; Lal 1982; Somasse 2013; Tandon 1984; Teshome 2019). Puett 2013 was a non-randomised trial that we deemed ineligible for data extraction because the control arm only included one cluster (a single Upazila inpatient facility) that could not be divided into subclusters for re-analysis.

Adesoro 2021 was set in Nigeria and evaluated the treatment of uncomplicated SAM by non-clinical LHWs (called Community-Oriented Resource Persons) implemented into the iCCM programme using simple tools. Three studies set in India evaluated Anganwadi Workers (Chanani 2019; Lal 1982; Tandon 1984), and another study from India evaluated tribal village workers (Dani 2017). Kozuki 2020 was conducted in South Sudan and evaluated the identification and treatment of SAM in an iCCM programme

delivered by low-literate Community-Based Distributors. Puett 2013 took place in Bangladesh and evaluated the identification and treatment of SAM by LHWs. Somasse 2013 was set in Burkina Faso and evaluated the identification and treatment of children and pregnant or lactating women with SAM by LHWs in a village setting. Amthor 2009 was conducted in Malawi during the 2006 famine food aid crisis. Teshome 2019 was conducted in Ethiopia and evaluated the Outpatient Therapeutic Programme (OTP) for SAM treatment by Health Extension Workers (HEWs) working in health posts.

All studies were set in remote, rural, tribal, or village settings, except Chanani 2019, which was set in Dharavi, an inner-city Indian slum. All studies evaluated the identification and treatment of uncomplicated SAM in children aged five years or younger, except Chanani 2019 and Puett 2013, which focused on children aged three years or under, and Somasse 2013, which included both moderate and severe malnutrition in children aged five years or under and pregnant or lactating women.

All programmes included a screening/identification component by LHWs to identify eligible children (or women), followed by treatment with RUTF, micronutrients, and antimicrobials for those with SAM; weekly anthropometric or MUAC monitoring; and referral of children with complications or co-morbidities or who failed to respond. The maximum duration of interventions ranged from eight to 16 weeks.

Interventions were mainly delivered at the participants' homes (Adesoro 2021; Amthor 2009; Hanlon 2016), at Anganwadi centres (Chanani 2019; Goudet 2018; Lal 1982; Tandon 1984), in community-based feeding centres (Dani 2017), at the LHW's home (Kozuki 2020), in outpatient clinics (Puett 2013), in village-based nutrition centres (Somasse 2013), and at community-based health posts (Teshome 2019).

Risk of bias in included studies

Figure 3 summarises the risk of bias assessments for all outcomes in the randomised trials, Figure 4 summarises the risk of bias assessment for all outcomes in the non-randomised trials, and Figure 5 shows a graph of the risk of bias assessments for all outcomes in the non-randomised trials. The Characteristics of included studies table and Table 2 provide more information about risk of bias in the included studies.

Figure 3. Risk of bias assessments for all outcomes in the randomised trials

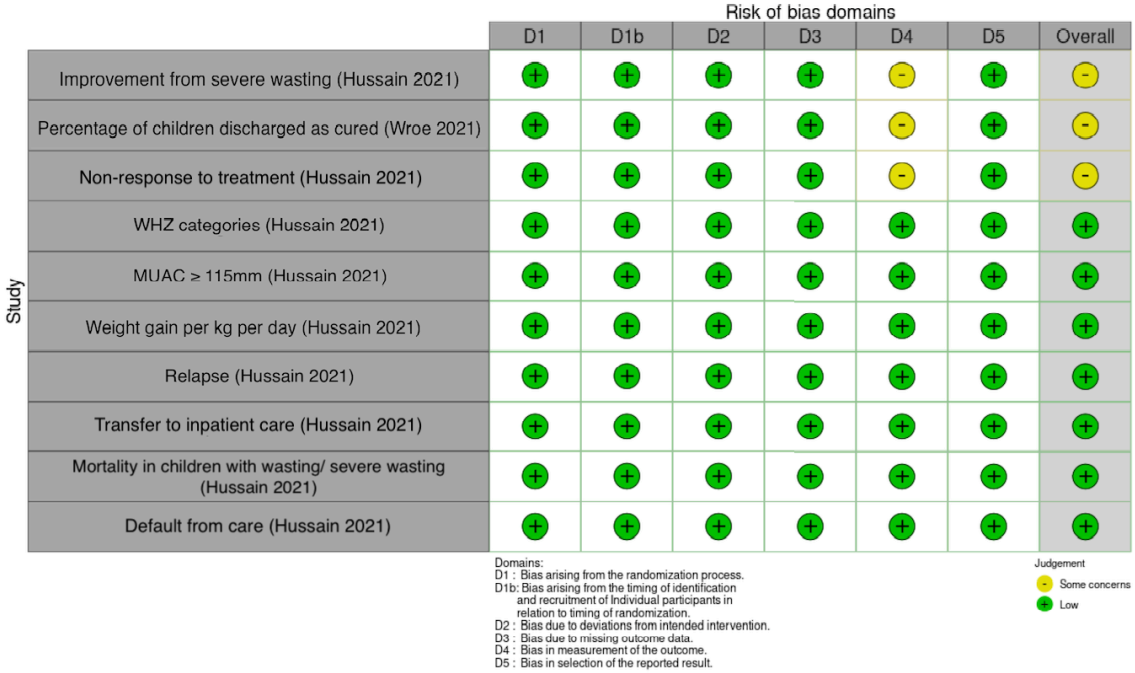


Figure 4. Non-randomised trials EPOC risk of bias summary – All outcomes. MUAC: mid-upper arm circumference.

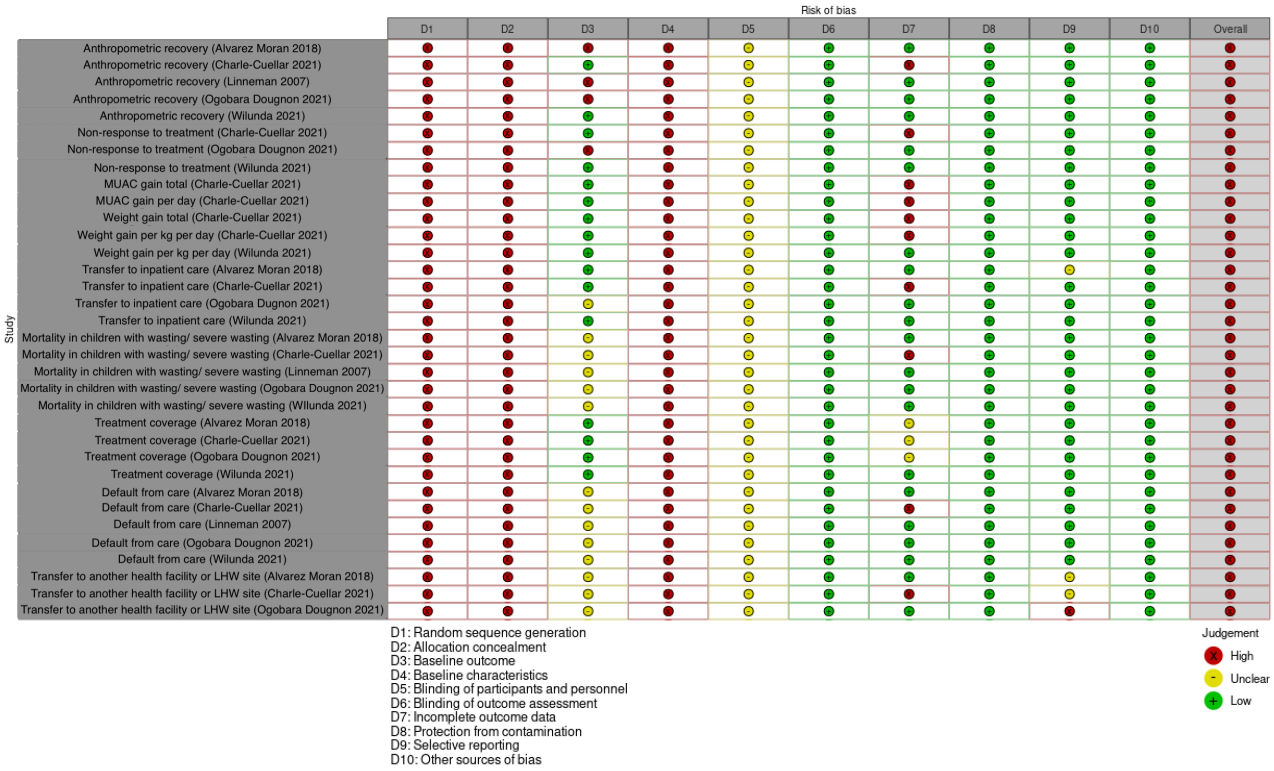
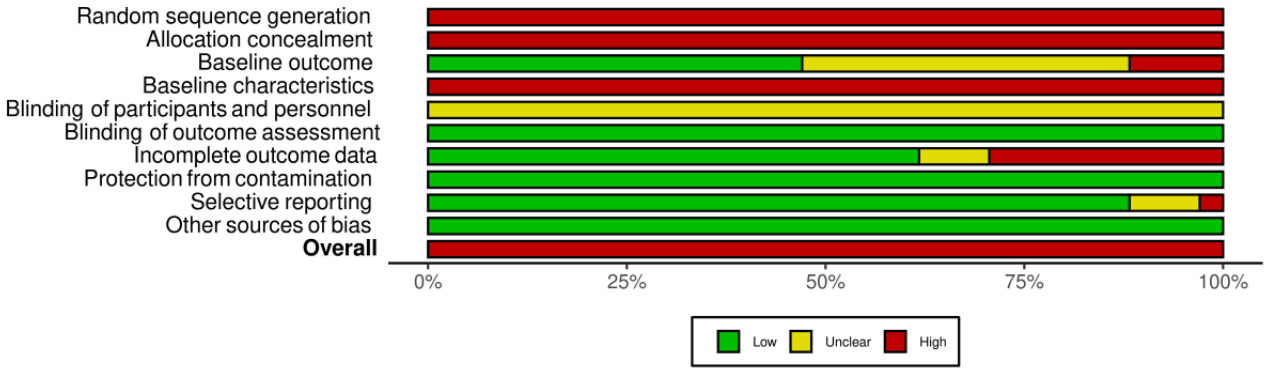


Figure 5. Cochrane Effective Practice and Organisation of Care (EPOC) risk of bias graph for non-randomised trials.



Randomised controlled trials

Bias arising from the randomisation process

Both RCTs had a low risk of bias in this category (Hussain 2021; Wroe 2021).

Bias arising from the timing of identification or recruitment of participants

Both RCTs had a low risk of bias in this category (Hussain 2021; Wroe 2021).

Bias due to deviations from intended interventions

Both RCTs had a low risk of bias in this category across all outcomes (Hussain 2021; Wroe 2021). The children and care providers were not blinded, but there was no evidence that this influenced the outcome.

Bias due to missing outcome data

Both RCTs had a low risk of bias in this category across all outcomes (Hussain 2021; Wroe 2021).

Bias in the measurement of the outcome

For the percentage of children aged six months to 59 months with moderate or severe malnutrition discharged as cured in Wroe 2021, and for recovery and non-response in Hussain 2021, there was some concern for risk of bias in this category due to the requirement for the child to be "clinically well" to be categorised as "cured" or "recovered", which may or may not be subject to bias based on the allocated group. As the studies provided no operational definitions for being "clinically well", we deemed this a subjective measure.

Bias in the selection of the reported result

Both RCTs were at low risk of bias in this category across all outcomes (Hussain 2021; Wroe 2021).

Overall risk of bias

For the percentage of children discharged as cured in Wroe 2021, and recovery and non-response in Hussain 2021, there was some concern related to overall risk of bias, but Hussain 2021 was at low overall risk of bias for the other outcomes.

Non-randomised studies

Bias arising from the randomisation process: random sequence generation, allocation concealment, and differences in baseline characteristics

All non-randomised trials were at high risk of bias in these categories due to lack of randomisation, lack of allocation concealment, and unequal baseline characteristics (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021)

Bias arising from the timing of identification or recruitment of participants: differences in baseline outcomes

For four outcomes (recovery in Alvarez Moran 2018, Linneman 2007, and Ogobara Dougnon 2021; and non-response in Ogobara Dougnon 2021), the corresponding studies were at high risk of bias in this category due to unequal outcome values at baseline. Around half (16) of the remaining outcomes had a low risk of bias due to unequal outcome values at baseline (recovery, non-response, and anthropometry outcomes in Charle-Cuellar 2021 and Wilunda 2021; transfer to inpatient care in Alvarez Moran 2018, Charle-Cuellar 2021, and Wilunda 2021; and treatment coverage in Alvarez Moran 2018, Charle-Cuellar 2021, Ogobara Dougnon 2021, and Wilunda 2021). For the final 14 outcomes, the risk of bias due to outcome values at baseline was unclear due to irrelevance (mortality in Alvarez Moran 2018, Charle-Cuellar 2021, Linneman 2007, Ogobara Dougnon 2021, and Wilunda 2021; default in Alvarez Moran 2018, Charle-Cuellar 2021, Linneman 2007, Ogobara Dougnon 2021, and Wilunda 2021; and transfer to another LHW site or health facility in Alvarez Moran 2018, Charle-Cuellar 2021, and Ogobara Dougnon 2021) or lack of information (transfer to an inpatient facility in Ogobara Dougnon 2021).

Bias due to deviations from intended interventions: blinding of participants and personnel

Risk of bias was unclear for this category across all outcomes in all non-randomised studies (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). The children and care providers were not blinded, but it was unclear whether this had any influence on the outcome.

Bias due to missing outcome data: incomplete outcome data

For most outcomes (recovery, non-response, anthropometry, transfer to inpatient care, mortality, default, and transfer to another LHW site or health facility) most non-randomised trials were at low risk of bias in this category (Alvarez Moran 2018; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). In Charle-Cuellar 2021, the risk of bias for these outcomes was high due to a lack of outcome data for a large proportion of the assigned population (19.7% of the intervention group and 16.7% of the control group). For treatment coverage, the risk of bias in this category was unclear in Alvarez Moran 2018, Charle-Cuellar 2021, and Ogobara Dougnon 2021 due to insufficient information regarding the number of people surveyed to obtain this outcome, while the risk of bias was low in Wilunda 2021.

Bias in measurement of the outcome: blinding of outcome assessment

All non-randomised trials had a low risk of bias in this category for all the outcomes (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021). Though no studies blinded the outcome assessors, there was no evidence that lack of blinding influenced the outcome.

Bias arising from lack of protection from contamination

All non-randomised trials had a low risk of bias in this category for all the outcomes (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021).

Bias in the selection of the reported result: selective outcome reporting

For anthropometric outcomes, we judged two non-randomised studies at low risk of bias in this category (Charle-Cuellar 2021; Wilunda 2021), though we noted that Charle-Cuellar 2021 implied rather than prespecified these outcomes. For transfer to inpatient care, risk of bias was unclear in Alvarez Moran 2018, which did not prespecify the outcome, but the other studies were at low risk. For transfer to another LHW site or health facility, Ogobara Dougnon 2021 was at high risk due to the lack of a definition, risk of bias was unclear in Alvarez Moran 2018 because the outcome was not prespecified, and the other non-randomised studies were at low risk of bias in this category (Charle-Cuellar 2021; Linneman 2007; Wilunda 2021).

Bias arising from other sources

All the non-randomised studies had a low risk of bias from other sources (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021).

Overall risk of bias

All the non-randomised studies had a high overall risk of bias for all outcomes due to high risk in at least one category (Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021).

Effects of interventions

See: **Summary of findings 1** Summary of findings – Randomised controlled trials; **Summary of findings 2** Summary of findings – Non-randomised controlled trials

Summary of findings 1 summarises the findings from the RCTs, and Summary of findings 2 summarises the findings from the non-randomised studies.

Intervention 1: identification by lay health workers of children with wasting

One stepped-wedge cluster-RCT assessed identification by LHWs of children with wasting but without medical complications versus identification by health professionals in health facilities (Wroe 2021). LHWs and health professionals used the same criteria for identification of wasting. The results for this comparison are described under Intervention 2.

Intervention 2: identification by lay health workers of children with wasting and medical complications needing referral

Wroe 2021 also assessed identification by LHWs of children with wasting and medical complications needing inpatient care versus identification by health professionals in health facilities. LHWs and health professionals followed the same criteria for identification of wasting and for programme admission and discharge.

Percentage of children who recovered from moderate or severe wasting (anthropometric recovery)

Wroe 2021 defined "cure" according to the Malawi Ministry of Health guidelines for children aged six to 59 months: MUAC of 125 mm or more, WHZ of −2 or more, no bilateral pitting oedema, and clinically well and alert for two consecutive visits (Malawi MOH 2016).

The results from Wroe 2021 indicate that identification and referral for treatment by LHWs, compared with treatment by health professionals following self-referral, may result in little or no difference in the percentage of children who recover from moderate or severe wasting (MD 1.00%, 95% CI −2.53 to 4.53; 1 RCT, 90 cluster-months, 6 clusters including 29,475 households pre- and postintervention; low-certainty evidence; Analysis 1.1). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision.

Intervention 3: identification and treatment by lay health workers of children with wasting but no medical complications needing referral

Six studies assessed treatment by LHWs (in community settings) of children with wasting but without medical complications needing referral to inpatient care versus identification and treatment by health professionals in health facilities (Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021), or versus screening and identification by LHWs followed by treatment by health professionals in health facilities (Alvarez Moran 2018; Hussain 2021; Wilunda 2021). One of these studies was an RCT (Hussain 2021). The LHWs and health professionals followed the same criteria for identification of wasting, the same criteria for programme admission and discharge, and the same treatment protocols. In all studies, the intervention involved both the identification and treatment of child wasting, and the individual components were not analysed separately.

Anthropometric recovery

Six studies assessed recovery.

Randomised controlled trials

Hussain 2021 defined improvement (anthropometric recovery) from severe wasting as MUAC of 115 mm or more, clinically well, absence of oedema for two consecutive visits, and a minimum stay of eight weeks in the programme. The results suggest that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may slightly reduce improvement in severe wasting in children (RR 0.93, 95% CI 0.86 to 0.99; absolute effect 60 fewer per 1000 children, 95% CI 120 fewer to 9 fewer per 1000; 1 RCT, 789 children; low-certainty evidence; Analysis 1.2). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision. A sensitivity analysis of these results with an ICC of 0.05 widened the CI, suggesting little or no effect (RR 0.93, 95% CI 0.77 to 1.11; Analysis 1.3).

Non-randomised controlled trials

The non-randomised studies defined anthropometric recovery as follows.

- Alvarez Moran 2018: WHZ of −1.5 or above or MUAC above 125 mm for two consecutive visits and absence of nutritional oedema for 14 days
- Charle-Cuellar 2021: absence of oedema and WHZ of −1.5 or above or MUAC above 125 mm
- Linneman 2007: no oedema and weight-for-height above 85%
- Ogobara Dougnon 2021: no oedema for 14 days and WHZ of −2 or above or MUAC above 125 mm
- Wilunda 2021: MUAC of 125 mm or above

The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on anthropometric recovery in children with moderate or severe wasting (RR 1.06, 95% CI 1.00 to 1.11; absolute effect 49 more per 1000 children, 95% CI 0 fewer to 89 more per 1000; I^2 = 74%; 5 non-RCTs, 6688 children; very low-certainty evidence; Analysis 1.2). We downgraded the certainty of the evidence due to serious risk of bias, serious inconsistency, and serious imprecision. In the intervention arms of these studies, LHWs treated 20.7% of children in Charle-Cuellar 2021, 39.2% in Ogobara Dougnon 2021, 79.0% in Alvarez Moran 2018, and 100% in Linneman 2007 and Wilunda 2021. As Alvarez Moran 2018, Charle-Cuellar 2021, and Ogobara Dougnon 2021 did not compare the baseline characteristics of children treated by LHWs and by health professionals, it is unclear if this was a source of bias. A sensitivity analysis of these results with an ICC of 0.05 widened the CI, further decreasing the certainty of the evidence (RR 1.05, 95% CI 0.98 to 1.12; I^2 =27%; Analysis 1.3).

Charle-Cuellar 2021 and Ogobara Dougnon 2021 performed subgroup analyses of the children in the intervention group. Charle-Cuellar 2021 reported that the rates of anthropometric recovery might be similar in children treated by LHWs or health professionals in health facilities (hazard ratio (HR) 1.135, 95% CI 0.86 to 1.50; 496 children), while Ogobara Dougnon 2021 reported that anthropometric recovery rate might be higher in children treated by LHWs compared with those treated by health professionals (HR 1.25, 95% CI 1.12 to 1.40; 1963 children). After disaggregation of data in the intervention group and secondary analysis of the data in Alvarez Moran 2018, the study authors reported that anthropometric recovery rates might be higher in children treated

by LHWs compared with those treated by health professionals (odds ratio (OR) 3.31, 95% CI 1.77 to 6.19; 823 children). However, the evidence from these analyses is of very low certainty due to very serious risk of bias.

Non-response to treatment

One RCT and three non-randomised studies assessed non-response.

Randomised controlled trials

Hussain 2021 defined non-response to treatment as not meeting the criteria for recovery within four months. The results suggest that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may slightly increase non-response to treatment for wasting in children (RR 1.44, 95% CI 1.04 to 2.01; absolute effect 64 more per 1000 children, 95% CI 6 more to 146 more per 1000; 1 RCT, 789 children; low-certainty evidence; Analysis 1.4). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision. A sensitivity analysis of these results with an ICC of 0.05 widened the CI, suggesting little or no effect (RR 1.44, 95% CI 0.61 to 3.43; Analysis 1.5).

Non-randomised controlled trials

The non-randomised studies defined non-response to treatment as follows.

- Linneman 2007: not achieving weight-for-height above 85% of ideal, or relapse requiring inpatient treatment
- Ogobara Dougnon 2021: persistent oedema at 21 days or no weight gain in two consecutive visits
- Wilunda 2021: not meeting discharge criteria after three months of treatment

The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on non-response to treatment for wasting in children (RR 1.29, 95% CI 0.93 to 1.78; absolute effect 12 more per 1000 children, 95% CI 3 fewer to 32 more per 1000; I^2 = 0%; 3 non-RCTs, 3807 children; very low-certainty evidence; Analysis 1.4). We downgraded the certainty of the evidence for very serious risk of bias and serious imprecision. In the intervention arms of these studies, LHWs treated 39.2% of children in Ogobara Dougnon 2021 and 100% in Linneman 2007 and Wilunda 2021. A sensitivity analysis of these results with an ICC of 0.05 widened the CI, further decreasing the certainty of the evidence (RR 1.29, 95% CI 0.77 to 2.14; I^2 = 0%; Analysis 1.5).

Ogobara Dougnon 2021 conducted subgroup analyses of children in the intervention group and reported that rates of non-response to treatment might be lower in children with wasting treated by LHWs compared with those treated by health professionals (HR 0.586, 95% CI 0.38 to 0.91; 1963 children). However, the evidence is of very low certainty due to very serious risk of bias.

Sustained recovery

No studies assessed sustained recovery.

Anthropometric outcomes

One RCT and two non-randomised studies reported anthropometric outcomes.

Weight-for-height Z-score in normal or underweight range on discharge

One RCT reported WHZ in non-wasting range (above −2) on discharge (Hussain 2021). The evidence suggests that identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may result in little or no difference in the number of children with WHZ in the non-wasting range on discharge (RR 0.94, 95% CI 0.28 to 3.18; absolute effect 37 fewer per 1000 children, 95% CI 444 fewer to 1000 more per 1000; 1 RCT, 789 children; low-certainty evidence; Analysis 1.6). We downgraded the certainty of the evidence due to very serious imprecision.

Weight-for-height Z-score in moderate wasting range on discharge

One RCT reported WHZ in the moderate wasting range (between −3 and −2) on discharge (Hussain 2021). The evidence suggests that identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with WHZ in the moderate wasting range on discharge (RR 1.09, 95% CI 0.87 to 1.36; absolute effect 26 more per 1000 children, 95% CI 38 fewer to 104 more per 1000; 1 RCT, 789 children; moderate-certainty evidence; Analysis 1.7). We downgraded the certainty of the evidence due to serious imprecision.

Weight-for-height Z-score in severe wasting range on discharge

One RCT reported WHZ in the severe wasting range (below −3) on discharge (Hussain 2021). The evidence suggests that identification and treatment of children with severe wasting by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with WHZ in the severe wasting range on discharge (RR 1.23, 95% CI 0.75 to 2.04; absolute effect 17 more per 1000 children, 95% CI 18 fewer to 76 more per 1000; 1 RCT, 789 children; moderate-certainty evidence; Analysis 1.7). We downgraded the certainty of the evidence due to serious imprecision.

Mid-upper arm circumference greater than or equal to 115 mm on discharge

One RCT reported MUAC greater than or equal to 115 mm on discharge (Hussain 2021). The evidence suggests that identification and treatment of children with severe wasting by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably results in little or no difference in the number of children with MUAC greater than or equal to 115 mm on discharge (RR 0.99, 95% CI 0.93 to 1.06; absolute effect 8 fewer per 1000 children, 95% CI 59 fewer to 51 more per 1000; 1 RCT, 789 children; moderate-certainty evidence; Analysis 1.8). We downgraded the certainty of the evidence due to serious imprecision.

Total mid-upper arm circumference gain

One non-randomised study assessed total MUAC gain (Charle-Cuellar 2021). The evidence is very uncertain about the effect

of treatment by LHWs or health professionals, compared with treatment by health professionals only, on total MUAC gain in children with severe wasting (median gain 2 mm higher; median 13.0 mm, interquartile range (IQR) 9.0 to 16.0 in the intervention group compared with median 11.0 mm, IQR 8.0 to 15.0 in the comparison group; 1 non-RCT, 532 children; very low-certainty evidence). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision. LHWs treated 20.7% of the children in the intervention arm.

Charle-Cuellar 2021 conducted subgroup analyses of the children in the intervention group and reported that total MUAC gain might be lower among children treated by LHWs compared with those treated by health professionals (median gain 1 mm less; median 12.0 mm, IQR 7.0 to 14.0 in children treated by LHWs compared with median 13.0 mm, IQR 9.5 to 17.0 in children treated by health professionals; 364 children). However, the evidence is of very low certainty due to very serious risk of bias.

Mid-upper arm circumference gain per day

One non-randomised study assessed MUAC gain per day (Charle-Cuellar 2021). The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on MUAC gain per day in children with severe wasting (median gain 0.02 mm/day higher; median gain 0.29 mm/day, IQR 0.20 to 0.43 in the intervention compared with median 0.27 mm/day, IQR 0.17 to 0.41 in the comparison group; 1 non-RCT, 531 children; very low-certainty evidence). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision. LHWs treated 20.7% of the children in the intervention arm.

Charle-Cuellar 2021 conducted subgroup analyses of the children in the intervention group and reported that MUAC gain per day might be similar in children treated by LHWs and those treated by health professionals (median gain 0 mm/day higher; median gain 0.29 mm/day, IQR 0.21 to 0.48 in children treated by LHWs compared with median 0.29 mm/day, IQR 0.19 to 0.43 in children treated by health professionals; 364 children). However, the evidence is of very low certainty due to very serious risk of bias.

Total weight gain

One non-randomised study assessed total weight gain (Charle-Cuellar 2021). The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on total weight gain in children with severe wasting (median gain 12.5 g/kg higher; median 209.7 g/kg, IQR 164.6 to 255.2 in intervention group compared with median 197.2 g/kg, IQR 157.9 to 254.3 in comparison group; 1 non-RCT, 517 children; very low-certainty evidence). We downgraded the certainty of the evidence due to serious risk of bias and imprecision. LHWs treated 20.7% of the children in the intervention arm.

Charle-Cuellar 2021 conducted subgroup analyses of the children in the intervention group. They reported that total weight gain might be similar in children treated by LHWs compared with those treated by health professionals (median gain 15.2 g per kg lower; median 196.2 g/kg, IQR 168.4 to 232.5 in children treated by LHWs compared with median 211.4 g/kg, IQR 163.9 to 261.5 in children treated by health professionals; 356 children). However, the evidence is of very low certainty due to very serious risk of bias.

Weight gain per day

One RCT and two non-randomised studies assessed weight gain per day.

Results from the RCT Hussain 2021 indicate that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, results in little or no difference in weight gain per day in children with severe wasting (mean weight gain 0.5 g/kg/day higher, 95% CI 1.74 lower to 2.74 higher; 1 RCT, 571 children; high certainty; Analysis 1.9).

The evidence from the non-randomised study Wilunda 2021 is very uncertain about the effect of treatment by LHWs compared with treatment by health professionals on mean weight gain per day in children with severe wasting (mean weight gain 0 g/kg/day higher, 95% CI 0.89 lower to 0.89 higher; 1 non-RCT, 343 children; very low-certainty evidence; Analysis 1.9). We downgraded the certainty of the evidence due to serious risk of bias.

The evidence from the non-randomised study Charle-Cuellar 2021 is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on median weight gain per day in children with severe wasting (median weight gain 0.05 g/kg/day higher; median 4.73 g/kg/day, IQR 0.20 to 0.43 in the intervention group compared with median 4.68 g/kg/day, IQR 0.17 to 0.41 in the comparison group; 1 non-RCT, 517 children; very low-certainty evidence). We downgraded the certainty of the evidence due to serious risk of bias and serious imprecision. LHWs treated 20.7% of the children in the intervention arm.

Charle-Cuellar 2021 conducted a subgroup analysis of the children in the intervention group. They reported that there might be a trend towards greater median weight gain per day among children treated by LHWs compared with those treated by health professionals (median weight gain 0.86 g/kg/day higher; median 5.49 g/kg/day, IQR 3.76 to 8.38 in children treated by LHWs compared with median 4.63 g/kg/day, IQR 3.35 to 7.54 in children treated by health professionals; 356 children). However, the evidence is of very low certainty due to very serious risk of bias.

Relapse

One RCT reported relapse, defined as MUAC below 115 mm within two months in children who recovered from wasting (Hussain 2021). The evidence suggests that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on relapse of severe wasting in children (RR 1.03, 95% CI 0.69 to 1.54; absolute effect 4 more per 1000 children, 95% CI 44 fewer to 76 more per 1000; 1 RCT, 649 children; moderate-certainty evidence; Analysis 1.10). We downgraded the certainty of the evidence due to serious imprecision.

Deterioration to severe wasting

No studies assessed deterioration to severe wasting. However, five studies assessed transfer to inpatient care.

Transfer to inpatient care

One RCT and four non-randomised studies assessed transfer to inpatient care.

In the RCT Hussain 2021, children with complications such as fever, pneumonia, anorexia, and dehydration were referred to inpatient care. The results indicate that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on transfer of children with severe wasting to inpatient care (RR 3.71, 95% CI 0.36 to 38.23; absolute effect 7 more per 1000 children, 95% CI 2 fewer to 93 more per 1000; 1 RCT, 829 children; moderate-certainty evidence; Analysis 1.11). We downgraded the certainty of the evidence due to serious imprecision.

The non-randomised studies referred children to inpatient care for the following reasons.

- Alvarez Moran 2018: presence of danger signs and failed appetite test on first day of treatment
- Charle-Cuellar 2021: appearance of severe signs of illness, persistent oedema, absence of weight gain in non-oedematous children, or weight loss
- Ogobara Dougnon 2021: appearance of severe medical complications or loss of appetite
- Wilunda 2021: development of medical complications, oedema, weight loss or appetite loss, or static weight on 3 consecutive visits, or request by caregiver

The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on the transfer of children with severe wasting to inpatient care (RR 1.42, 95% CI 1.04 to 1.95; absolute effect 17 more per 1000 children, 95% CI 2 more to 38 more per 1000; I^2 = 0%; 4 non-RCTs, 4739 children; very low-certainty evidence). We downgraded the certainty of the evidence due to serious risk of bias. In the intervention arms of these trials, LHWs treated 20.7% of children in Charle-Cuellar 2021, 39.2% in Ogobara Dougnon 2021, 79% in Alvarez Moran 2018, and 100% in Wilunda 2021.

Charle-Cuellar 2021 and Ogobara Dougnon 2021 conducted subgroup analyses of the children in the intervention group. Charle-Cuellar 2021 reported that there might be a trend towards lower transfer rates to inpatient care among children treated by LHWs compared with those treated by health professionals (HR 0.25, 95% CI 0.06 to 1.02; 496 children). Ogobara Dougnon 2021 reported that transfer rates to inpatient care might be similar in children treated by LHWs compared with those treated by health professionals (HR 0.69, 95% CI 0.28 to 1.70; 1963 children). However, the evidence is of very low certainty due to very serious risk of bias.

Mortality among children with wasting/severe wasting

One RCT and five non-randomised studies assessed mortality among children with wasting or severe wasting.

The evidence from the RCT Hussain 2021 suggests that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may have little or no effect on mortality in children with severe wasting (RR 0.46, 95% CI 0.04 to 5.98; absolute effect 3 fewer per 1000 children, 95% CI 5 fewer to 25 more per 1000; 1 RCT, 829 children; low-certainty evidence; Analysis 1.12). We downgraded the certainty of the evidence due to very serious imprecision.

The evidence from the non-randomised studies is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on mortality in children with wasting (RR 0.89, 95% CI 0.56 to 1.44; absolute effect 2 fewer per 1000 children, 95% CI 7 fewer to 7 more per 1000; I^2 = 0%; 5 non-RCTs, 6688 children; very low-certainty evidence; Analysis 1.12). We downgraded the certainty of the evidence due to serious risk of bias and imprecision. In the intervention arms of these trials, LHWs treated 20.7% of children in Charle-Cuellar 2021, 39.2% in Ogobara Dougnon 2021, 79% in Alvarez Moran 2018, and 100% in Linneman 2007 and Wilunda 2021.

Charle-Cuellar 2021 and Ogobara Dougnon 2021 performed subgroup analyses of children in the intervention group. Charle-Cuellar 2021 reported that mortality rates might be similar in children treated by LHWs and those treated by health professionals in health facilities (0 deaths in both arms; 496 children), while Ogobara Dougnon 2021 reported that mortality rates might be lower among children treated by LHWs compared with those treated by health professionals (HR 0.23, 95% CI 0.068 to 0.785; 1963 children). Disaggregation of data in the intervention group and secondary analysis of the data in Alvarez Moran 2018 indicated that mortality rates might be similar among children treated by LHWs compared with those treated by health professionals (OR 2.75, 95% CI 0.58 to 13.04; 823 children). However, the evidence is of very low certainty due to very serious risk of bias.

Appropriate identification of children with wasting

No studies assessed appropriate identification of children with wasting.

Appropriate identification of children with oedema

No studies assessed appropriate identification of children with oedema.

Appropriate referral of children with moderate or severe wasting

No studies assessed appropriate referral of children with moderate or severe wasting.

Treatment coverage

Four non-randomised studies assessed treatment coverage. Alvarez Moran 2018 determined SQUEAC single coverage as equal to $(C_{in} + R_{in})/(C_{in} + R_{in} + C_{out} + R_{out})$, where C is the number of current SAM cases, R is the number of recovering SAM cases, 'in' is in programme and 'out' is not in programme. Charle-Cuellar 2021 and Ogobara Dougnon 2021 conducted surveys at baseline and endline applying SQUEAC standardised methodology. Wilunda 2021 determined the proportion of children with SAM being reached with treatment based on the number of children treated from baseline to endline.

Only Wilunda 2021 provided sufficient data for analysis. The evidence is very uncertain about the effect of treatment by LHWs compared with treatment by health professionals on treatment coverage in children with severe wasting (RR 1.94, 95% CI 1.62 to 2.32; absolute effect 392 more per 1000 children, 95% CI 258 more to 550 more per 1000; 1 non-RCT, 445 children; very low-certainty evidence; Analysis 1.13). We downgraded the certainty of the evidence due to serious risk of bias.

Alvarez Moran 2018 reported that treatment coverage was 43.9% in the intervention area and 43.8% in the comparison area at baseline,

and 86.7% in the intervention area and 41.6% in the comparison area at endline (P < 0.0001; 1 non-RCT, number of children not reported). Charle-Cuellar 2021 reported that treatment coverage was 53.6% in the intervention area and 43.5% in the comparison area at baseline, and 71.7% in the intervention area and 44.2% in the comparison area at endline (P = 0.012 after adjustment for initial coverage; 1 non-RCT, number of children not reported). Ogobara Dougnon 2021 reported that treatment coverage was 58.1% in the intervention area and 51.9% in the comparison area at baseline, and 61.2% in the intervention area and 43.6% in the comparison area at endline (P = 0.006; 1 non-RCT, number of children not reported). The evidence is of very low certainty due to serious risk of bias.

Caregiver adherence to care plans

No studies assessed caregiver adherence to care plans. However, six studies assessed default.

Default from care

One RCT and five non-randomised studies assessed default from care.

The RCT Hussain 2021 defined default from care as absence on two consecutive visits. The results indicate that identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, probably has little or no effect on default from care in children with severe wasting (RR 1.48, 95% CI 0.65 to 3.40; absolute effect 12 more per 1000 children, 95% CI 9 fewer to 60 more per 1000; 1 RCT, 829 children; moderate-certainty evidence; Analysis 1.14). We downgraded the certainty of the evidence due to serious imprecision.

The non-randomised trials defined default from care as follows.

- Charle-Cuellar 2021 and Linneman 2007: absence on two follow-up visits
- Ogobara Dougnon 2021 and Alvarez Moran 2018: absence on two consecutive visits
- Wilunda 2021 absence on three consecutive visits

The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on default from care in children with wasting (RR 0.57, 95% CI 0.40 to 0.82; absolute effect 43 fewer per 1000 children, 95% CI 59 fewer to 18 fewer per 1000; I^2 = 63%; 5 non-RCTs, 6688 children; very low-certainty evidence; Analysis 1.14). We downgraded the certainty of the evidence due to serious risk of bias and serious inconsistency. In the intervention arms of these trials, LHWs treated 20.7% of children in Charle-Cuellar 2021, 39.2% in Ogobara Dougnon 2021, 79% in Alvarez Moran 2018, and 100% in Linneman 2007 and Wilunda 2021.

Charle-Cuellar 2021 and Ogobara Dougnon 2021 performed subgroup analyses of children in the intervention group. Charle-Cuellar 2021 reported that rates of default from care might be similar among children treated by LHWs compared with those treated by health professionals in health facilities (HR 0.38, 95% CI 0.05 to 2.91; 496 children). Ogobara Dougnon 2021 reached the same conclusion (HR 1.04, 95% CI 0.72 to 1.50; 1963 children). Disaggregation of data in the intervention group and secondary analysis of the data in Alvarez Moran 2018 indicated that the rates of default from care might be lower among children treated by LHWs compared with those treated by health professionals (OR 3.35 favouring LHWs, 95% CI 1.70 to 6.58; 823 children). However, the evidence is of very low certainty due to very serious risk of bias.

Adverse effects and other harms

No studies assessed adverse effects or other harms. However, three studies assessed transfer to another LHW site or health facility.

Transfer to another lay health worker site or health facility

Three non-randomised studies assessed transfer to another LHW site or health facility (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021).

The evidence is very uncertain about the effect of treatment by LHWs or health professionals, compared with treatment by health professionals only, on transfer of children with severe wasting to another LHW site or health facility (RR 1.67, 95% CI 1.04 to 2.68; absolute effect 12 more per 1000 children, 95% CI 1 more to 31 more per 1000; I^2 = 0%; 3 non-RCTs, 4381 children; very low-certainty evidence; Analysis 1.15). We downgraded the certainty of the evidence due to serious risk of bias. In the intervention arm of these trials, LHWs treated 20.7% of children in Charle-Cuellar 2021, 39.2% in Ogobara Dougnon 2021, and 79% in Alvarez Moran 2018.

Charle-Cuellar 2021 and Ogobara Dougnon 2021 conducted subgroup analyses of the intervention groups. Charle-Cuellar 2021 reported that rates of transfer to another LHW site or health facility might be higher among children treated by LHWs compared with those treated by health professionals (RR 4.44, 95% CI 2.15 to 9.17; 496 children). Ogobara Dougnon 2021 reported that rates of transfer to another LHW site or health facility might be similar among children treated by LHWs compared with those treated by health professionals (HR 0.85, 95% CI 0.43 to 1.70; 1963 children). However, the evidence is of very low certainty due to high risk of bias.

DISCUSSION

Our review aimed to assess the effectiveness of identification and treatment of moderate and severe wasting in children aged five years or under by lay health LHWs, compared with treatment by health professionals or by health facility-based teams.

Summary of main results

We found seven eligible studies, all of which used cluster allocation. Five were non-RCTs and two were RCTs, one of which used a stepped-wedge design. All studies were conducted in low-income countries in predominantly remote and rural settings where access to care is a major challenge. We addressed 13 outcomes, including rate of recovery, non-response, relapse, deterioration, mortality, anthropometric outcomes, treatment coverage, default from care, and transfer rate. The overall risk of bias was high for all non-randomised studies and low for the two RCTs.

Based on the results of one stepped-wedge cluster-randomised trial, identification and referral for treatment by LHWs, compared with treatment by health professionals following self-referral, may result in little or no difference in the percentage of children who recover from moderate to severe wasting.

Based on the results of one cluster-randomised trial, identification and treatment by LHWs, compared with treatment by health professionals following identification and referral by LHWs, may slightly reduce improvement from severe wasting and may slightly increase non-response to treatment in children with severe wasting. Evidence from the same study suggests that identification and treatment of severe wasting in children by LHWs, compared with treatment by health professionals following identification and referral by LHWs: may result in little or no difference in the number of children with WHZ in the non-wasting range (above −2) on discharge; probably results in little or no difference in the number of children with WHZ in the moderate wasting range (between −3 and −2) and severe wasting range (below −3); probably results in little or no difference in the number of children with MUAC greater than or equal to 115 mm on discharge; results in little or no difference in weight gain per day; probably has little or no effect on relapse, transfer to inpatient care and default from care; and may have little or no effect on mortality among children with severe wasting.

The evidence from non-randomised trials was very uncertain for anthropometric recovery, non-response to treatment, total MUAC gain, MUAC gain per day, total weight gain, transfer to inpatient care, treatment coverage, default from care, and transfer to another LHW site or health facility.

Overall completeness and applicability of evidence

We found several limitations in the completeness and applicability of the evidence synthesised in this review.

Populations

No studies included children aged under six months. Six studies included in the quantitative synthesis were conducted in Africa (Malawi, Mali, Mauritania, Niger, Tanzania) and only one in Asia (Pakistan). The reported prevalence of wasting is lower in East Africa than in West Africa, where most included studies took place. However, child wasting is twice as prevalent in South Asia as in sub-Saharan Africa (UNICEF 2021). Readers of this review should exercise caution when translating the evidence to settings with a higher prevalence of wasting, as this difference might affect the feasibility of and adherence to the intervention. In addition, we identified no studies from Latin America or studies of economically disadvantaged, racial, and ethnic minorities or other vulnerable populations in high-income countries, so our findings might not be representative of such contexts.

Interventions

LHWs received training in all studies, and they were supervised in six studies. Therefore, our review may not apply to contexts where LHWs do not receive training before identifying or treating children with wasting. Our review is likely to be most useful in contexts were LHWs are an established cadre of health workers, or where there are plans for LHWs to become part of the health system, with training, supervision, and possibly remuneration. Our review is also limited by the small number of studies focused on identification of children with wasting by LHWs in a community setting. Most included studies evaluated the treatment of wasting by LHWs. In the comparator group of some studies, LHWs screened children for malnutrition and referred them to health facilities for confirmatory diagnosis and treatment. Although the identification and treatment of acute malnutrition is not yet integrated into the routine screening and treatment by LHWs, it is widely accepted that the iCCM strategy for the treatment of children for diarrhoea, pneumonia, and malaria enables LHWs to screen and identify children with SAM at the community level (Young 2012).

Comparators

In the comparator groups of all seven studies, health professionals administered treatment for wasting in health facilities. There were no studies where the comparator was treatment of wasting by health facility-based teams comprising both health care professionals and LHWs. Therefore, our findings might not be generalisable to contexts where usual care for malnutrition is provided by mixed teams of health professionals and LHWs at health facilities.

Outcomes

No studies included direct measurement of sustained recovery (e.g. nutritional recovery sustained for at least six months). Only one study assessed relapse (e.g. presentation with wasting within six months of discharge), providing uncertain evidence. In addition, no studies directly assessed deterioration to severe wasting. However, five studies assessed transfer to inpatient care, which likely reflects deterioration of the child's health status; the evidence was of very low certainty for four of these studies. For the outcomes of transfer to inpatient care, non-response, and default from care, we are unsure of the final outcome (recovery/relapse or sustained recovery/death) because follow-up was relatively short. Therefore, the long-term effects on child health status are uncertain. No studies assessed the appropriate identification of children with wasting or oedema or the appropriate referral of children with moderate or severe wasting. Evidence from this review might therefore not adequately address the question of the efficacy of LHWs in identifying children with wasting in a community setting or referring children with complicated wasting to inpatient care.

Cost-effectiveness

Assessing cost-effectiveness was not an objective of this review. However, three included studies performed cost-effectiveness analyses, in Tanzania (Wilunda 2021), Mali (Alvarez Moran 2018), and Pakistan (Hussain 2021). The studies in rural Mali and rural Tanzania suggested that treatment of uncomplicated SAM by LHWs achieves good coverage and is a cost-effective intervention compared with outpatient facility-based care by health professionals. However, the study in Pakistan reported that outpatient facility-based care was more cost-effective than care delivered by LHWs in communities, likely due to the low coverage and low recovery rate. Therefore, there is still uncertainty about the cost-effectiveness of these interventions.

Coverage

Training more health cadres, such as LHWs, to deliver certain interventions might lead to an increase in intervention access and utilisation (WHO 2012). In our review, we identified limited evidence regarding the effectiveness of LHWs on increasing treatment coverage for wasting. However, previous systematic reviews with evidence appraisal concluded that the use of LHWs may increase coverage of care-seeking for any iCCM illness (Oliphant 2021).

Quality of the evidence

For most outcomes, our review findings are based on one RCT that included 829 children. We judged this trial at low overall risk of bias

for some but not all outcomes. As a result, the certainty of evidence from this trial was downgraded for serious risk of bias for some outcomes and also for serious or very serious imprecision for some outcomes.

Five studies (6688 participants) were analysed as non-RCTs. One of these studies was randomised but had only one cluster per arm (Alvarez Moran 2018). We graded all the evidence from these five studies as very low-certainty due to the lack of randomisation and because of important differences in baseline characteristics between the intervention and control arms. In three of these studies, the intervention arm offered care by health professionals as an alternative to care by LHWs, and LHW participation in the intervention arms ranged from 21% to 79%. This further complicates the interpretation of the results. Post-hoc disaggregation of the data in the intervention arm introduced further bias and did not improve the certainty of the evidence.

There was some variability in the included outcomes and their definitions across studies, which might hinder interpretability. Future studies should employ standardised approaches to better capture the intervention impact and ensure reproducibility in the effect estimate.

We identified three ongoing studies, only one of which addresses our review question as its primary goal (ISRCTN60973756).

Finally, we consider that publication bias is unlikely, as we identified published studies with small or no effect, which might be more difficult to publish.

Potential biases in the review process

We were aware of the possibility of introducing bias at every stage of the review process, and we tried to minimise this in several ways. Two or three review authors independently assessed eligibility for inclusion, carried out data extraction, and assessed the risk of bias of the trials.

During meta-analysis, we adjusted for clustering rather than for confounders because it was not possible to adjust for both factors based on the available information, and we placed more importance on clustering.

Agreements and disagreements with other studies or reviews

Our findings support those of another review that assessed the opportunities and challenges related to the inclusion of SAM treatment in the current curative tasks of LHWs (Lopez-Ejeda 2019). Specifically, the 2019 review identified scarce evidence on this treatment model, and reported that existing studies differ in their design and implementation, hindering extrapolation across different contexts. Lopez-Ejeda 2019 did not identify the lack of large randomised studies as an issue, derived most summarised evidence from prospective studies, and did not assess the certainty of the evidence.

AUTHORS' CONCLUSIONS

Implications for practice

Our review reveals an overall lack of certainty in the evidence regarding the effectiveness of identification and treatment of wasting in children aged five years or under by lay health workers (LHWs) compared with treatment by health professionals or health facility-based teams. LHWs in the included studies treated children at or near the children's homes with home-based ready-to-use therapeutic food (RUTF), with or without vitamins, antibiotics, or de-worming treatment; and monitored their response, referring them to inpatient care when necessary. Evidence from one randomised controlled trial indicated that treatment of severe wasting by health professionals following identification by LHWs may be more effective than identification and treatment by LHWs for improving recovery and response, but both interventions had similar effects on anthropometric outcomes, relapse, mortality among children with wasting, transfer to inpatient care, and default from care. Further rigorous evaluation is needed to inform future practice.

Implications for research

Our current knowledge on the effectiveness of LHWs for identifying and treating wasting in children is predominantly based on studies with very low-certainty evidence due to lack of randomisation, small sample sizes, and heterogeneity in interventions, study settings, and LHW characteristics. As a result, findings from these trials may be biased and lack generalisability. Future studies should:

- focus on greater methodological rigour to reduce the risks of bias. There is a need for well-designed cluster-randomised controlled trials with well-documented protocols describing both the content and delivery of the interventions with detailed information on the selection, training, and supervision of the LHWs to inform policy development, resource allocation, and service implementation;
- include more standardised reporting of study characteristics, such as the intracluster correlation coefficient (ICC) in cluster-randomised trials, to facilitate planning of future trials by helping to determine optimal clustering and sample sizes;
- include longer follow-up periods to build the evidence base on relapse and mortality; and
- specifically examine adverse effects and other harms to ensure these interventions are not causing unintentional effects.

It is also important to develop consensus in the field on the assessment and reporting of outcomes, including coverage, to allow easier comparisons and statistical pooling in future systematic reviews.

The evidence identified in the review is specific to children aged six months to five years with severe wasting and without medical complications needing referral. Future studies should evaluate treatment by LHWs of children aged under six months, or identification by LHWs of wasted children who need inpatient treatment.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Alvarez Moran 2018

Study characteristics	
Methods	Study design: multicentre, cluster-randomised intervention study with 1 cluster per arm Duration of study: February 2015 to February 2016
Participants	Country: Mali, West Africa Geographical scope: communes of Tambaga, Bougarabaya and Kobiri in the area of Kita, in the Kayes region of Mali Intervention setting: outpatient Population: children with severe acute malnutrition. 934 children were recruited, 699 in the intervention arm and 235 in the comparison arm Age: 6 months to 59 months Gender: both Socioeconomic background: ~60% low-medium SES Inclusion criteria • SAM according to Mali's national protocol (i.e. between 6 months and 59 months of age; MUAC < 115 mm; bilateral oedema or WHZ < −3) • Parental consent to take part in the study Exclusion criteria • Residence outside the study areas • Complications that required treatment in the stabilisation centre in Kita (URENI)
Interventions	Stated purpose: to explore the potential of integrating SAM treatment as part of iCCM services delivered by CHWs Intervention classification: treatment **Intervention** Name: ICCM+ (Mali) Delivered by: CHWs or HFs (3). 552 of 699 participants received care from CHWs Title or name of CHW or LHW and number: CHW, 17 Selection: not stated Educational background: 3 with primary education, 13 with secondary education, 1 with tertiary education; 13 midwives, 3 health aides (health staff who has received at least 6 months of training in a health school and passed an internship of 3 months in a health centre)

Alvarez Moran 2018 *(Continued)*

	Training: initially trained for 2 weeks on iCCM and CMAM; received refresher training 6 months into the study Supervision: supervisory visits twice per month by Action Against Hunger staff and supervisory visits every 3 months by National Institute for Research in Public Health staff Incentives and remuneration: CHWs were salaried workers Intervention details • Frequency and duration: active community screening every 3 months. Admitted participants were followed up weekly until discharge • Content of intervention: CHWs, with the support of community volunteers, carried out active community screening every 3 months and passive screening through the study period. CHWs referred all children with complicated SAM (i.e. presence of danger signs and failed appetite test) to a nearby stabilisation centre for inpatient care. CHWs treated children with SAM with amoxicillin, albendazole, and vitamin A and RUTF sachets and monitored their growth weekly until discharge. They gave essential nutritional and treatment counselling to caretakers **Control:** usual treatment. Mothers of the malnourished children took them to HFs (4) for diagnosis of SAM and treatment by doctors and nurses, usually weekly visits to monitor growth while receiving treatment of RUTF sachets until discharge **Co-interventions:** classification and treatment of pneumonia, malaria, and diarrhoea
Outcomes	Participant • Clinical outcomes (cure, death and defaulter ratios) of children enroled in the programme • MUAC at admission and cases referred for hospitalisation on the first day of treatment Process and health worker outcomes: treatment coverage and quality of care Economic outcomes: cost-effectiveness Time points: at baseline and on discharge
Notes	Source of funding: The Innocent Foundation Notes on validation of instruments: none Additional information: none Data handling: none Prospective trial registration number: retrospectively registered in ISRCTN (ISRCTN33578874) on 7 March 2018

Charle-Cuellar 2021

Study characteristics	
Methods	Study design: non-RCT Duration of study: November 2018 to July 2019
Participants	Country: Mauritania Geographical scope: agropastoral (rural) region of Guidimakha; included the communes of Ould Yengé and Dafor in the Department of Ould Yengé, commune of Baydiam in the Khabou Department and the communes of Sélibabi and Hassi Cheggar in the Department of Sélibabi

Charle-Cuellar 2021 *(Continued)*

Intervention setting: community

Population: children with SAM. 869 children were recruited, 618 in the intervention arm and 251 in the comparison arm

Age: 6 months to 59 months

Gender: both

Socioeconomic background: most did not have a cement floor, a handmade earth brick roof, or potable water in the house. About half stated cost and distance as healthcare access barriers

Inclusion criteria

- Case presented at HF or CHW's site, or detected by community volunteers or mobile clinics
- Mild or moderate oedema
- MUAC < 115 mm or WHZ < −3 or both

Exclusion criteria

- Severe oedema
- Other medical conditions
- Failed appetite test

Interventions	Stated purpose: to assess the effectiveness and coverage of SAM treatment delivered by CHWs in the Guidimakha region in Mauritania compared to the HF-based approach Intervention classification: treatment **Intervention:** outpatient treatment for uncomplicated SAM from HF or CHWs Name: integration of SAM treatment as part of the iCCM package delivered by CHWs Delivered by: 12 CHWs and 10 HFs. 20.7% of children were treated by CHWs at the time of admission Title or name of CHW or LHW and number: CHWs, 12 Selection: not stated Educational background: not stated Training: 21 days on basic health assistance package of iCCM using the training module of the Ministry of Health, including health promotion; IYCF practices; hygiene practices; family planning; neonatal care; management of diarrhoea, malaria and pneumonia; and treatment of acute malnutrition. Pretests and post-tests were conducted Supervision: periodic supportive supervision by healthcare-responsible staff from the HF and Action Against Hunger supervisors Incentives and remuneration: not reported Intervention details • Frequency and duration: weekly until exit criteria were reached (MUAC > 125 mm or WHZ > 1.5 or both) • Content of intervention: 170 kcal/kg/day of RUTF to be used at home, monitoring (rechecked once per week), amoxicillin 50 mg/kg/day to 100 mg/kg/day divided into 2 doses for 5 days, 1 dose of 500 mg mebendazole at the first visit. Medical referral was considered when severe signs of illness appeared, oedema did not disappear, absence of weight gain in non-oedematous children for 21 days and weight loss **Control:** outpatient treatment for uncomplicated SAM from 6 HFs

Charle-Cuellar 2021 *(Continued)*

	Co-interventions: none
Outcomes	Participant • Proportion of cured children (absence of oedema and WHZ ≥ 1.5 or MUAC > 125 mm or both for 2 consecutive weeks) • Proportion of defaulters (absent at 2 follow-up visits) • Proportion of nonresponse (not recovered after 3 months of treatment) • Length of stay (from date of admission to date of discharge) • Number of RUTF sachets received during treatment Process and health worker outcomes: coverage Economic outcomes: none Time points: baseline and after intervention
Notes	Source of funding: USAID and Action Against Hunger Notes on validation of instruments: WHO Anthro software was used to calculate WHZ Additional information: none Data handling: none Prospective trial registration number: not reported

Hussain 2021

Study characteristics	
Methods	Study design: 2-armed cluster-RCT with 3 clusters in each arm Duration of study: April 2015 to July 2016
Participants	Country: Pakistan Geographical scope: in Dadu, a rural district in Sindh Province, Pakistan Intervention setting: health houses (served as outpatient facilities) Population: children with SAM, 829 recruited, 430 in intervention arm and 399 in comparison Age: 6 months to 59 months Gender: both Socioeconomic background: 29.3% to 31.4% had experienced moderate hunger (based on a household hunger scale), and 0.3% to 1.2% had experienced severe hunger. 29.1% to 42.6% had improved water facilities; 98.5% to 98.6% had improved sanitation facility Inclusion criteria • MUAC < 115 mm with appetite Exclusion criteria • Medical complications
Interventions	Stated purpose: to evaluate the impact of SAM treatment on performance indicators of CMAM (recovery, relapse, death and default) in children 6 months to 59 months of age delivered at health

Hussain 2021 *(Continued)*

	house level by lady health workers compared with the standard CMAM programme delivered at the HF by government and NGO staff Intervention classification: treatment and identification **Intervention** Name: CMAM delivered by lady health workers Delivered by: lady health workers Title or name of CHW or LHW and number: lady health workers, 72 Selection: not stated Educational background: minimum 8th grade standard formal education and 2 years of training on family planning and basic child health Training: the health workers were trained by master trainers from Action Against Hunger on CMAM protocols (following the National CMAM Guidelines of Pakistan, 3 days), SAM case management, and IYCF (based on UNICEF's IYCF package, 4 days) and supply management (2 days) for 9 days in total. After 3 months to 6 months, a refresher on the updated CMAM guidelines was provided Supervision: the health workers' supervisors monitored them once per month; 3 Action Against Hunger nurses supervised them twice per week Incentives and remuneration: lady health workers (part of an existing government programme, each attached to a government HF) received an allowance of USD 142 per month. No additional salary for participation in this trial Intervention details • Frequency and duration: weekly until discharge (when MUAC ≥ 125 mm) • Content of intervention: the health workers identified and treated all cases of SAM according to the eligibility criteria, managed all uncomplicated SAM cases at home according to CMAM guidelines, identified and referred complicated SAM cases to the stabilisation centre, and provided individual counselling on IYCF practices to children's mothers and caretakers. Children were provided with weekly rations of RUTF and routine drugs (antibiotics and folic acid) and were assessed weekly until discharge **Control:** management by an HF. 72 lady health workers trained on National CMAM Guidelines of Pakistan identified and referred SAM cases (MUAC < 115 mm) to the nearest HF or satellite site per CMAM guidelines and provided health education and counselling on IYCF practices to mothers **Co-interventions:** none
Outcomes	Primary outcome measure: rate of recovery (Pakistan national guidelines for the CMAM 2014 will be used to measure this outcome) Secondary outcome measure • Prevalence of malnutrition • Relapse from SAM (according to Pakistan national guidelines for CMAM 2014) • Default cases of SAM (according to Pakistan national guidelines for CMAM 2014) Economic outcome: cost-effectiveness Time points: recruited children were followed up for 2 months to 6 months
Notes	Source of funding: Innocent Foundation through Action Against Hunger (ACF) International Notes on validation of instruments: none Additional information: none

Hussain 2021 *(Continued)*

	Data handling: none Prospective trial registration number: the study was retrospectively registered in ClinicalTrials.gov with ID NCT03043352 on 6 February 2017

Linneman 2007

Study characteristics	
Methods	Study design: non-randomised cluster-controlled trial Duration of study: May 2005 to May 2006
Participants	Country: Malawi Geographical scope: Southern Malawi. Only 1 of 12 centres was located in a town. Only 2 of 12 centres were located along a main road Intervention setting: home-based, with treatment issued by rural health centre, mission hospital, or district hospital (control group); rural health centre and mission hospital (both intervention groups) Population: children with moderate and severe malnutrition and good appetite. 2937 children were recruited (622 in intervention 1; 885 in intervention 2; and 1430 in control arm) Age: 6 months to 60 months Gender: both Socioeconomic background: unknown Inclusion criteria • Moderate (70% to 85% reference weight-for-height) or severe (< 70% reference weight-for-height or presence of oedema) malnutrition • Good appetite Exclusion criteria • Severe oedema • Anorexia
Interventions	Stated purpose: to test if home-based therapy with RUTF would achieve acceptable clinical outcomes compared with international standards and better outcomes than reported by institutions delivering standard therapy Intervention classification: treatment **Intervention 1** Name: home-based RUTF Delivered by: community health aids Title or name of CHW or LHW and number: community health aids from 3 study centres (2 rural health centres and 1 mission hospital) Selection: not stated Educational background: not stated

Linneman 2007 *(Continued)*

Training: 1 month by 2 senior, experienced nurses from the College of Medicine, including working with nurse trainers for 4 days

Supervision: monthly problem-solving and retraining visits by nurse trainers

Incentives and remuneration: not stated

Intervention details

- Frequency and duration: every 2 weeks for 8 weeks; children were discharged before 8 weeks if they had WHZ > 0 based on admission height or if they relapsed (recurrence of oedema or systemic infection requiring inpatient admission) or died
- Content of intervention: upon enrolment, provision of locally produced RUTF in sealed plastic jars providing 733 kJ/kg/d (175 kcal/kg/day) and 5.3 g/kg/day protein and micronutrients in accordance with WHO recommendations (1999) for catch-up growth; reassessment every 2 weeks at centre, where caretakers were asked if participants consumed the entire ration, and children had weight, height and MUAC measurements and oedema assessment. RUTF was provided at each visit based on weight. Caretakers were instructed on correct administration and avoidance of contamination

Intervention 2

Name: home-based RUTF

Delivered by: community health aids after participants had been referred by medical professionals for assessment and treatment

Title or name of CHW or LHW and number: 3 rural health centres and 1 mission hospital

Selection: not stated

Educational background: not stated

Training: 1 month by 2 senior, experienced nurses from the College of Medicine, including working with nurse trainers for 4 days

Supervision: monthly problem-solving and retraining visits by nurse trainers

Incentives and remuneration: not stated

Intervention details

- Frequency and duration: every 2 weeks for 8 weeks; children were discharged before 8 weeks if WHZ > 0 based on admission height or if they relapsed (recurrence of oedema or systemic infection requiring inpatient admission) or died
- Content of intervention: upon enrolment, provision of locally produced RUTF in sealed plastic jars providing 733 kJ/kg/d (175 kcal/kg/day) and 5.3 g protein/kg/day and micronutrients in accordance with WHO recommendations (1999) for catch-up growth; reassessment every 2 weeks at centre, where caretakers were asked if participants consumed the entire ration, and participants underwent weight, height and MUAC measurements and oedema assessment. RUTF was provided at each visit based on weight. Caretakers were instructed on correct administration and avoidance of contamination

Control: home-based RUTF delivered by medical professionals from 2 rural health centres, 2 mission hospitals and 1 district hospital; trained by 2 senior, experienced nurses from the College of Medicine for 1 month, including working with nurse trainers for 4 days. Participants were seen every 2 weeks for 8 weeks and were discharged before 8 weeks if WHZ > 0 based on admission height, if they relapsed and required inpatient admission, or if they died. Upon enrolment, locally produced RUTF was given in sealed plastic jars, providing 733 kJ/kg/d (175 kcal/kg/d) and 5.3 g protein/kg/day and micronutrients in accordance with WHO recommendations (1999) for catch-up growth. Reassessment was performed every two weeks at the centre, where caretakers were asked if participants consumed the entire ration, and participants underwent weight, height and MUAC measurements and oedema assessment. RUTF was provided at each visit based on weight. Caretakers were instructed on correct administration and avoidance of contamination

Linneman 2007 *(Continued)*

	Co-interventions: none
Outcomes	Participant • Recovered • Failed • Died • Dropped out • Weight gain per day in first 4 weeks • MUAC increase per day in first 4 weeks • Statural growth rate • Comparison with international standards Process and health worker outcomes: none Economic outcomes: none Time points: baseline and discharge
Notes	Source of funding: UNICEF and World Food Programme Notes on validation of instruments: WHO criteria were used to categorise participants' malnutrition status Additional information: none Data handling: data presented for dichotomous outcomes for each centre in every group were summed to give total N and number of participants who achieved the outcome (n) in each group Prospective trial registration number: none

Ogobara Dougnon 2021

Study characteristics	
Methods	Study design: non-RCT Duration of study: children recruited between June 2018 and March 2019
Participants	Country: Niger, West Africa Geographical scope: mainly desert lands; 2 rural communes in the health district of Mayahi: Maïreyreye (control) and Guidan Amoumoune (intervention), in the north of the Mayahi department, in the region of Maradi, located in the Sahel zone of Niger Intervention setting: outpatient (HFs or health huts) Population: children with SAM; 2789 recruited, 2022 in intervention arm and 767 in comparison arm Age: 6 months to 59 months Gender: both Socioeconomic background: farming was the main source of subsistence; homes rarely had cement floors (0.1% to 0.4%); 26.9% to 52.7% had roofs made of palm or leaves; 33.6% to 41.7% had a potable water source in the house; 64.3% to 74.4% preferred treatment with medication from the health centre over other sources; 36.8% to 42.8% cited fees as barriers to access Inclusion criteria

Ogobara Dougnon 2021 *(Continued)*

- Age 6 months to 59 months
- Diagnosed with SAM according to any of the following criteria
  - MUAC < 115 mm
  - bilateral oedema
  - WHZ < −3
- Parents or guardians can provide informed consent

Exclusion criteria

- Residence outside the study areas
- Complications that require treatment in the stabilisation centre in Mayahi. Cases with severe oedema, medical complications or negative appetite tests were excluded from the study and referred for inpatient treatment

Interventions	Stated purpose: to assess the effectiveness and impact on treatment coverage of integrating SAM management at the health hut level by nonmedical CHWs in the Mayahi health district, Maradi region in Niger, with special attention to the anthropometric criteria for admission to treatment Intervention classification: treatment **Intervention** Name: Action Against Hunger project − Niger Delivered by: 10 CHWs in health huts and nurses in 6 HFs. 39.2% of children were treated by CHWs Title or name of CHW and number: CHWs, 10 Selection: not stated Educational background: formal health education Training: the CHWs were trained for 4 days in national protocols for the management of SAM as established by Niger's Ministry of Public Health. This training was facilitated by 3 trainers, 1 from the central level, 1 from the regional level and 1 from the district Supervision: not stated Incentives and remuneration: employed by the prefecture or communities through local contracts Intervention details • Frequency and duration: weekly until discharge • Content of intervention: CHWs and HFs provided diagnosis, RUTF sachets and discharge from care, with all admissions recorded. Admitted children received 170 kcal/kg of RUTF daily and were followed up weekly until recovery **Control:** usual treatment (diagnosis of SAM and treatment at 4 HFs by nurses). These visits are usually weekly, to monitor growth while receiving RUTF sachets until discharge **Co-interventions:** none

Outcomes	Participant
	
	• Cure rate, assessed at every visit to the HF or with the CHW (weekly basis), defined as:
	  ◦ weight-to-height ratio > 1.5; and
	  ◦ MUAC > 125 cm
	• Death rate
	• Defaulter rate
	
	Process and health worker outcomes: coverage
	
	Economic outcomes: none

Ogobara Dougnon 2021 *(Continued)*

	Time points: baseline and end of study
Notes	Source of funding: all the actions in the field were supported by funds coming from OFDA, USAID (award no. AID-OFDA-G-17-00277) Notes on validation of instruments: none Additional information: none Data handling: none Prospective trial registration number: ISRCTN31143316 2018

Wilunda 2021

Study characteristics	
Methods	Study design: parallel 2-arm noninferiority quasi-experimental pilot study Duration of study: enrolment from August 2018 to December 2019 in the intervention group and from August 2018 to February 2020 in the control group. Follow-up ended on 26 March 2020
Participants	Country: Tanzania Geographical scope: Simiyu and Ruvuma regions of northern Tanzania. 3 rural wards (Sakwe, Ihusi and Mwadobana) in Bariadi District and 3 rural wards (Malampaka, Busilili and Shishiyu) in Maswa District were selected purposively as intervention and control areas Intervention setting: in the community and in participants' homes Population: children with SAM (364 recruited, 210 in the intervention arm and 154 in the comparison arm) Age: 6 months to 59 months Gender: both Socioeconomic background: 12.4% to 34.3% of children scored in the lowest quintile of the household wealth index, 13.0% to 22.4% in the second quintile, 11.7% to 27.1% in the middle quintile and 14.3% to 24.3% in the fourth quintile Inclusion criteria • MUAC < 11.5 cm or mild or moderate oedema • Good appetite Exclusion criteria • Severe oedema • Underlying medical condition or complications
Interventions	Stated purpose: to assess the effectiveness and cost-effectiveness of treatment of SAM by CHWs, and the effect of this intervention on SAM treatment coverage Intervention classification: treatment and identification **Intervention** Name: The Next Generation Programme – Integrated Promotion of Nutrition, Growth and Development

Wilunda 2021 *(Continued)*

	Delivered by: 13 CHWs Title or name of CHW or LHW and number: CHW, 13 Selection: not reported Educational background: not reported Training: CHWs and their supervisors were trained to screen and manage children with SAM, covering both theory and practice, by nutritionists from the Tanzania Food and Nutrition Centre. The training aimed to impart knowledge and skills in management of SAM among children younger than 5 years at the community level. CHWs and their supervisors from the intervention area received further training on home treatment of children with SAM without medical complications Supervision: supervised by programme staff and HF staff Incentives and remuneration: CHWs received incentives Intervention details • Frequency and duration: weekly until children exited the study after experiencing one of the study outcomes • Content of intervention: CHW screened and enroled children in the study. Children with SAM were treated at home using RUTF, with the dosage based on body weight. CHWs followed up enroled children through weekly home visits to replenish their RUTF and to monitor their progress by assessing their weight, MUAC and medical symptoms **Control:** 11 CHWs and their supervisors were trained to screen and manage children with SAM, covering both theory and practice, by nutritionists from the Tanzania Food and Nutrition Centre. The training aimed to impart knowledge and skills in management of SAM among children younger than 5 years at the community level CHWs screened and referred malnourished children to 1 health centre for treatment by health workers according to the standard national guidelines. Caretakers could also take their children directly to HFs. Health workers enroled children in the study using criteria similar to those used in the intervention district **Co-interventions:** none

Outcomes	Participant
	
	• Primary outcome: cure from SAM
	• Secondary outcomes
	  ◦ Default
	  ◦ Non-response
	  ◦ Transfer to inpatient therapeutic care
	  ◦ Death
	  ◦ Length of stay, defined as the number of days from treatment initiation to recovery
	  ◦ Average weight gain
	
	Process and health worker outcomes: coverage
	
	Economic outcomes: cost-effectiveness from the provider's perspective
	
	Time points: baseline and at the end of the intervention

Notes	Source of funding: Children’s Investment Fund Foundation Notes on validation of instruments: none Additional information: none Handling the data: none

Wilunda 2021 *(Continued)*

	Prospective trial registration number: registered in the Pan African Clinical Trial Registry (trial number PACTR201901856648139) on 21 December 2018

Wroe 2021

Study characteristics	
Methods	Study design: stepped-wedge, cluster-randomised design. 6 clusters participated in the study Duration of study: September 2016 and November 2018. The intervention was implemented in a new cluster every 3 months
Participants	Country: Malawi Geographical scope: Neno, a rural district of ~165,000 people Intervention setting: household Population: resident of 1 of the 11 catchment areas seeking routine care from an HF. A total of 29,475 households were included Age: birth to 15 years for paediatric malnutrition programmes; all ages for other programmes Gender: both Socioeconomic background: impoverished, no tarmac roads, only 3.4% had electricity Inclusion criteria • Resident of 1 of the 11 catchment areas • Seeks routine health care from an HF in Neno District Criteria for referral to the nearest HF for assessment (Malawi MOH 2016) • In infants (birth to 6 months): visible signs of undernutrition such as bilateral pitting oedema, visible wasting, weight loss and failure to grow (based on child growth chart) or who have difficulty with or ineffective breastfeeding • In all children (6 months to 59 months): MUAC < 12.5 cm or bilateral pitting oedema or both • In children aged 5 to 9 years: MUAC < 14.5 cm or bilateral pitting oedema or both • In children aged 10 to 15 years: MUAC < 18.5 cm or bilateral pitting oedema or both Exclusion criteria • Main place of residence outside Neno District
Interventions	Stated purpose: to assess if a 'Household Model' (where CHWs are assigned to households, rather than to specific participants with HIV or TB, and who are trained to provide support for a wider range of conditions including HIV, hypertension, diabetes, and paediatric malnutrition) improves retention in care for participants with chronic, noncommunicable diseases, along with increased uptake of women's health services and treatment for paediatric malnutrition, while sustaining the high retention rates for people in the HIV programme Intervention classification: identification and treatment **Intervention** Name: 'Household Model' Delivered by: CHWs Title or name of CHW and number: CHWs, 935

Wroe 2021 *(Continued)*

	Selection: able to read and write; living in the village they were serving Educational background: NA Training: 5 days of foundational training. Senior CHWs attended an additional 2 days of training on mentorship and supervision Supervision: CHWs met with senior CHW monthly. Senior CHW (n = 142) held routine meetings with facility-based site supervisors (n = 11). Site supervisors met with health surveillance assistants and other clinical staff monthly and elicited missed visits and other concerns and communicated the information to CHWs. Management meetings to review staffing, data and performance were held at the district level Incentives and remuneration: CHWs received a monthly stipend (USD 21; USD 32 for senior CHW) Intervention details • Frequency and duration: monthly household visits throughout the study • Content of intervention: each CHW was assigned to visit 20 to 40 households each month. Home visits included education and screening for sexually transmitted infections, TB, HIV and paediatric malnutrition, enrolment of pregnant women into ANC, and referral or accompaniment of symptomatic household members to clinic, as needed. For participants with HIV or TB or both, home visits are more frequent, and additional tasks were monitoring medication adherence and side effects, psychosocial support and tracked missed visits **Control:** existing model; daily visits to homes of participants with HIV or TB or both, with monitoring of medication adherence and side effects and accompaniment to clinic visits **Co-interventions:** none

Outcomes	Participant
	
	• Relevant to review
	  ○ Paediatric malnutrition case finding (number of children per 1000 aged 6 months to 59 months newly enroled in care for moderate or severe paediatric malnutrition)
	  ○ Severe paediatric malnutrition case finding (number of children per 1000 aged 6 months to 59 months newly enroled in care for severe paediatric malnutrition)
	  ○ Moderate paediatric malnutrition cure rate (percentage of children aged 6 months to 59 months discharged as cured in treatment programmes for moderate malnutrition)
	  ○ Paediatric malnutrition inpatient admission (number of children per 1000 aged 6 months to 59 months admitted in nutritional rehabilitation unit)
	• Others
	  ○ HIV, hypertension, asthma, diabetes, epilepsy, or mental health (percentage of enroled participants with a visit to integrated care clinic)
	  ○ TB (percentage of total population diagnosed with new confirmed TB cases)
	  ○ Percentage of TB cases completing treatment successfully (no loss to follow-up or death)
	  ○ ART initiation (percentage of participants initiating ART with visit in last 3 months)
	  ○ Percentage of population tested for HIV
	  ○ Family planning (percentage of women of childbearing age on long-term family planning methods or receiving modern family planning methods or newly initiating family planning)
	  ○ Percentage of expected pregnant women in ANC or starting ANC within first trimester or attending 4+ ANC visits
	  ○ Percentage of infants who attend 10-week visit
	
	Process and health worker outcomes: CHW retention
	
	Economic outcomes: none
	
	Time points: baseline and end of trial

Wroe 2021 *(Continued)*

Notes	Source of funding: the authors declared no specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors Notes on validation of instruments: none Additional information: none Handling the data: none Prospective trial registration number: NCT03106727

ANC: antenatal care; ART: antiretroviral treatment; CHW: community health worker; CMAM: community management of acute malnutrition; HF: health facility; iCCM: integrated community case management; IYCF: infant and young child feeding; LHW: lay health worker; MUAC: mid-upper arm circumference; NA: not applicable; NGO: nongovernmental organisation; OFDA: Office of US Foreign Disaster Assistance; RCT: randomised controlled trial; RUTF: ready-to-use therapeutic food; SAM: severe acute malnutrition; SES: socioeconomic status; TB: tuberculosis; UNICEF: United Nations Children's Fund; USAID: US Agency for International Development; WHO: World Health Organization; WHZ: weight-for-height Z-score.

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aboud 2011	Ineligible intervention
Adesoro 2021	Ineligible study design
Ale 2016	Ineligible intervention
Ale 2020	Ineligible intervention
Amthor 2009	Ineligible study design
Bailey 2018	Ineligible intervention
Bait 2019	Ineligible study design
Black 1995	Ineligible patient population
Bliss 2018	Ineligible study design
Bouckaert 2017	Ineligible patient population
Brenner 2011	Ineligible study design
Brown 1992	Ineligible patient population
Bui 2008	Ineligible study design
Chanani 2019	Ineligible study design
Charle-Cuellar 2021a	Ineligible comparator
Chaudhuri 1988	Ineligible study design
Chorlton 1989	Ineligible study design

Study	Reason for exclusion
CTRI/2013/02/003418 2013	Ineligible intervention
CTRI/2014/06/004664 2014	Ineligible intervention
CTRI/2018/03/012512 2018	Ineligible patient population
Dani 2016	Ineligible study design
Dani 2017	Ineligible study design
Daures 2020	Ineligible setting
Daures 2021	Ineligible intervention
David 2021	Ineligible comparator
Do 2018	Ineligible patient population
Eide 2016	Ineligible patient population
Faruque 2008	Ineligible study design
Galasso 2019	Ineligible patient population
Getachew 2021	Ineligible outcomes
Gopaldas 1988	Ineligible outcomes
Goudet 2018	Ineligible study design
Grantham-McGregor 1994	Ineligible intervention
ISRCTN03467700 2014	Ineligible intervention
ISRCTN10412166 2018	Ineligible intervention
ISRCTN14990746 2018	Ineligible comparator
ISRCTN24161700 2006	Ineligible outcomes
ISRCTN31143316 2018	Ineligible study design
ISRCTN31299262 2020	Ineligible patient population
ISRCTN51505201 2013	Ineligible intervention
ISRCTN65316374 2006	Ineligible patient population
ISRCTN96497560 2016	Ineligible intervention
Jack 2015	Ineligible patient population
James 2016	Ineligible study design
Jannat 2019	Ineligible outcomes

Study	Reason for exclusion
Jesson 2017	Ineligible intervention
Jordan 2018	Ineligible patient population
Kang 2017	Ineligible intervention
Kaphle 2016	Ineligible outcomes
Katzen 2020	Ineligible patient population
Keane 2013	Ineligible study design
Kemigisha 2016	Ineligible study design
Kim 2015	Ineligible study design
Kim 2016	Ineligible patient population
Kimani-Murage 2013	Ineligible intervention
Kimani-Murage 2015	Ineligible patient population
Kozuki 2020	Ineligible study design
Kulwa 2014	Ineligible patient population
Kumar 2021	Ineligible study design
la Course 2015	Ineligible setting
Laar 2015	Ineligible outcomes
Lal 1982	Ineligible study design
Lazzerini 2019	Ineligible setting
le Roux 2010	Ineligible patient population
le Roux 2011	Ineligible patient population
le Roux 2014	Ineligible patient population
le Roux 2015	Ineligible patient population
le Roux 2020	Ineligible patient population
Lopez-Ejeda 2019	Ineligible study design
Maust 2015	Ineligible intervention
Mayhew 2014	Ineligible study design
Miller 2014	Ineligible study design
Moramarco 2018	Ineligible study design

Study	Reason for exclusion
Morgan 2015	Ineligible study design
Nahar 2015	Ineligible patient population
Nair 2015	Ineligible intervention
Nair 2017	Ineligible route of administration
NCT00995592 2009	Ineligible patient population
NCT01333995 2010	Ineligible patient population
NCT01785680 2013	Ineligible setting
NCT01824940 2013	Ineligible intervention
NCT01863394 2013	Ineligible intervention
NCT02234726 2014	Ineligible intervention
NCT02249754 2014	Ineligible patient population
NCT02302729 2014	Ineligible intervention
NCT03455647 2018	Ineligible patient population
NCT03517878 2018	Ineligible patient population
NCT03759821 2018	Ineligible patient population
NCT03967015 2019	Ineligible intervention
NCT04704076 2021	Ineligible intervention
NCT04868669 2021	Ineligible patient population
Nimmagadda 2019	Ineligible intervention
Nkonki 2017	Ineligible study design
Puett 2013	Ineligible study design
Puett 2013b	Ineligible study design
Rautenbach 1985	Ineligible study design
Roche 2017	Ineligible patient population
Ruton 2018	Ineligible intervention
Sarma 2018	Ineligible study design
Saville 2016	Ineligible patient population
Shah More 2018	Ineligible study design

Study	Reason for exclusion
Silver 2016	Ineligible study design
Somasse 2013	Ineligible study design
Suchdev 2012	Ineligible patient population
Sunguya 2017	Ineligible comparator
Tadesse 2015	Ineligible study design
Tandon 1984	Ineligible study design
Tesfai 2016	Ineligible study design
Teshome 2019	Ineligible study design
Tomlinson 2016	Ineligible study design
UNICEF 2012	Ineligible study design
Van Boetzelaer 2019	Ineligible study design
van Roosmalen 1986	Ineligible intervention
Vijayaraghavan 1985	Ineligible intervention
Vijayaraghavan 1990	Ineligible study design
Vir 2013	Ineligible study design
Vir 2014	Ineligible intervention
Weber 2019	Ineligible patient population
Weisz 2011	Ineligible intervention
Westgard 2019	Ineligible comparator
World Vision 2014	Ineligible study design
Wynn 2017	Ineligible intervention
Yorick 2021	Ineligible intervention

Characteristics of studies awaiting classification *[ordered by study ID]*

Asma 1998

Methods	Non-RCT
Participants	Children < 5 years of age (100 in intervention group 1, 50 in intervention group 2 and 100 in control) in Sherikhan village
Interventions	Intervention group 1: a trained local village worker monitored children's body weight

Asma 1998 *(Continued)*

	Intervention group 2: children's own mothers monitored their body weight Control: physician in primary health centre monitored children's body weight
Outcomes	• Filling of child's calendar • Correct age • Correct entry of weight • Administrative information • Frequency of visits • Identification of risk factors • Loss rate of growth charts
Notes	Unable to source full text

Brems 1987

Methods	Repeated measures study
Participants	Children aged 6 months to 36 months
Interventions	An integrated nutrition and selected health service programme delivered by multipurpose health workers responsible for women's health and children outside the target group and community nutrition workers focussing on children 6 months to 36 months of age. Children identified through growth monitoring were enrolled in a supplemental programme that included daily feeding at the community nutrition centre and intensive counselling of mothers
Outcomes	• Growth parameters in children • Cost-effectiveness
Notes	Unable to source full text

Kuppusamy 2016

Methods	RCT
Participants	Infants < 12 months of age
Interventions	Community health nurses visited infants in their homes monthly to assess breastfeeding, immunisation status and growth developmental milestones; provide guidance; identify acute health care needs; and refer to tertiary care as appropriate The 'control' group received a baseline visit at 1 week and a final visit at 2 months and received no counselling services
Outcomes	• Exclusive breastfeeding • Immunisation uptake • Incidence of hospital admissions and physician visits • Growth parameters
Notes	Conference poster; did not appear to have any wasting identification or treatment interventions

Rahman 2006

Methods	Repeated measures study
Participants	Children with severe acute malnutrition
Interventions	RUTF (locally produced food product (chickpea, sesame seed, dried skimmed milk, sugar, oil and cocoa-powder fortified with minerals and vitamins))
Outcomes	• Recovery rate • Mortality rate
Notes	Unable to source full text

Sierra 2019

Methods	Non-RCT
Participants	Nearly 11,000 children < 2 years of age in 1038 rural communities
Interventions	Volunteer-led community-based growth monitoring and promotion programme implemented by decentralised providers
Outcomes	• Prevalence of stunting • Global undernutrition • Wasting • Exclusive breastfeeding • Ablactation • Antenatal care • Follow-up of children with acute diarrhoea
Notes	Conference abstract; prevention study

RCT: randomised controlled trial; RUTF: ready-to-use therapeutic food.

Characteristics of ongoing studies *[ordered by study ID]*

ISRCTN60973756

Study name	Effectiveness, cost-effectiveness and coverage of the treatment of severe acute malnutrition delivered by community health workers through a protocol based on simplified approaches in emergency settings of Mali
Methods	Cluster-randomised controlled non-inferiority trial (treatment)
Participants	Inclusion criteria • Age 6 months to 59 months • Uncomplicated SAM • Positive appetite test result • No medical danger signs (severe oedema, unable to drink or suck, severe vomit, convulsing, non-response to external stimuli, severe palmar pallor, severe difficulty breathing, spontaneous bleeding, dark urine, unable to sit or stand, severe diarrhoea or dehydration)

ISRCTN60973756 *(Continued)*

Interventions	All children in the 3 study arms will receive weekly follow-up until meeting a discharge criterion Each cluster will correspond to 1 treatment provider (health centre or its group of CHWs), which means that there will be 6 groups of providers by arm. However, to avoid final real imbalance in cluster size, the unit of randomisation will be the health centre with a block allocation ratio of 2:1:1 **Intervention 1:** treatment provided in health centres and outside by CHWs following national protocol Admission criteria: oedema +/++ or WHZ < −3 or MUAC < 115 mm Treatment: RUTF according to weight (170 kcal/kg/day) Discharge criteria: WHZ > −1.5 or MUAC ≥ 125 mm **Intervention 2:** treatment provided in health centres and outside by CHWs following a modified protocol Admission criteria: oedema +/++ or MUAC < 115 mm or both Treatment: fixed amount of 2 sachets of RUTF per day (1000 kcal/day) except in children < 5 kg, who receive 1 sachet per day (500 kcal/day) Discharge criteria: WHZ > −1.5 or MUAC ≥ 125 mm **Control:** treatment provided only in health centres following the national protocol Admission criteria: oedema +/++ or WHZ < −3 or MUAC < 115 mm Treatment: RUTF according to weight (170 kcal/kg/day) Discharge criteria: WHZ > −1.5 or MUAC ≥ 125 mm
Outcomes	Primary outcomes • Recovery rate • Default rate • Decease rate • Referral rate Data will be extracted directly from the patient records existing in the health centres and health huts at the end of the study Secondary outcomes • Coverage compared at baseline and endline from 2 population-based surveys conducted at the beginning and end following the standardised SLEAC methodology • Cost-effectiveness: cost per child treated and cost per child recovered • Severity at admission (MUAC and WHZ measurements and oedema proportion) • Recovery time • Number of follow-up visits absent in children recovered • Number of RUTF sachets consumed by children recovered • Average weight and MUAC gain of children recovered • Number of cases treated for other non-severe common diseases in an integrated manner (diarrhoea, malaria, acute respiratory infection)
Starting date	Date of first enrolment: 1 July 2020
Contact information	nlopez@accioncontraelhambre.org
Notes	None

Mosha 2018

Study name	The impact of integrated nutrition-sensitive interventions on nutrition and health of children and women in rural Tanzania: study protocol for a cluster-randomised controlled trial
Methods	Cluster-RCT
Participants	Clusters were 10 villages within the Rufiji District, a rural area in eastern Tanzania. Participants were households that were eligible if they had a woman of reproductive age (18 years to 49 years), at least 1 child aged 6 months to 36 months, and a plot of land or containers where vegetables could be grown
Interventions	The intervention was delivered by AEWs, LEWs and CHWs through household visits. Households in the intervention arm received agricultural inputs for good production such as seeds, fertiliser and watering cans and information on cultivation and home gardening best practices. Households also received nutritional counselling (including prevention and management of child malnutrition and locally adapted instructions on the mix and quantity of food suited for children aged 6 months to 36 months) and a health-focused intervention (including information on micronutrient supplementation and integrated management of child illnesses and sage water, sanitation and hygiene practices). Participants were invited and encouraged to attend farmer field schools The control group was households that received the standard of care in the area for agricultural and health services
Outcomes	Primary outcome • Women's and children's dietary diversity Secondary outcomes • Women's and children's anaemia status • Child growth (weight-for-age Z-score, WHZ, height-for-age Z-score, MUAC) • Women's growth (BMI, MUAC) • Early childhood development • Reach and extent of intervention-promotion practices and behaviours
Starting date	July 2016
Contact information	dfmosha@hotmail.com
Notes	Trial registration NCT03311698

NCT02473796

Study name	Home based child care to reduce mortality and malnutrition in tribal children of Melghat, India: CRCT (HBCC)
Methods	Study design: RCT The Melghat area was divided into 5 clusters. 8 villages were randomly selected from each cluster by lottery method. All children younger than 5 years who are ill will be treated by trained VHWs Study period: 1 January 2004 to 30 April 2010 Study area: 19 villages for intervention and control area with population of 14,888 (intervention) and 16,310 (control)

NCT02473796 *(Continued)*

Participants	Inclusion criteria • All births and deaths in the village or catering hospital were included in the study • All children younger than 5 years in the villages were included in the study Exclusion criteria • All births and deaths outside the village were excluded from the study
Interventions	Intervention arm • Provision of home-based health care to pregnant mothers and children younger than 5 years through a trained semiliterate female VHW resident of the same village under medical supervision by trained medical supervisor • HBCC included treatment of various childhood illnesses by VHWs, including treatment of neonatal sepsis with gentamicin once daily by intramuscular injection; treatment of acute respiratory infection with co-trimoxazole syrup; treatment of diarrhoeal illness with oral rehydration salts, furoxone and metronidazole syrup; and treatment of malaria with syrup chloroquine and syrup paracetamol Comparator arm: population where the HBCC was not implemented Both arms: the health services were provided by the government-run primary healthcare services. Vital statistics data were collected by VHWs
Outcomes	• Neonatal mortality rate, infant mortality rate, child mortality rate (deaths per 1000 live births) • Prevalence of severe malnutrition (percentage of children)
Starting date	January 2004
Contact information	Dr Ashish Rambhau Satav, MAHAN Trust
Notes	

AEW: agricultural extension worker; BMI: body mass index; CHW: community health worker; HBCC: home-based childcare; LEW: livestock extension worker; MUAC: mid-upper arm circumference; RUTF: ready-to-use therapeutic food; SAM: severe acute malnutrition; VHW: village health worker; WHZ: weight-for-height Z-score.

RISK OF BIAS

Legend: ✓ Low risk of bias ✗ High risk of bias ~ Some concerns

Risk of bias for analysis 1.1 Anthropometric recovery: percentage of children aged 6–59 months who recovered from moderate or severe malnutrition

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Wroe 2021	✓	✓	✓	~	✓	~

Risk of bias for analysis 1.4 Non-response to treatment

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.4.1 RCTs						
Hussain 2021	✓	✓	✓	~	✓	~
Subgroup 1.4.2 Non-RCTs						
Charle-Cuellar 2021	✗	~	✗	✓	✓	✗
Ogobara Dougnon 2021	✗	~	✓	✓	✓	✗
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.6 Anthropometric outcomes: weight-for-height Z-score in normal or underweight range on discharge

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.6.1 Normal						
Hussain 2021	✓	✓	✓	✓	✓	✓

Risk of bias for analysis 1.7 Anthropometric outcomes: weight-for-height Z-score in moderate or severe wasting range on discharge

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.7.1 Moderate (WHZ between −3 and −2)						
Hussain 2021	✓	✓	✓	✓	✓	✓
Subgroup 1.7.2 Severe (WHZ < −3)						

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Hussain 2021	✓	✓	✓	✓	✓	✓

Risk of bias for analysis 1.8 Anthropometric outcomes: mid-upper arm circumference ≥ 115 mm on discharge

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Hussain 2021	✓	✓	✓	✓	✓	✓

Risk of bias for analysis 1.9 Anthropometric outcomes: weight gain per day (g/kg/day)

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.9.1 RCTs						
Hussain 2021	✓	✓	✓	✓	✓	✓
Subgroup 1.9.2 Non-RCTs						
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.10 Relapse

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Hussain 2021	✓	✓	✓	✓	✓	✓

Risk of bias for analysis 1.11 Transfer to inpatient care

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.11.1 RCTs						
Hussain 2021	✓	✓	✓	✓	✓	✓
Subgroup 1.11.2 Non-RCTs						
Alvarez Moran 2018	✗	~	✓	✓	~	✗
Charle-Cuellar 2021	✗	~	✗	✓	✓	✗
Ogobara Dougnon 2021	✗	~	✓	✓	✓	✓
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.12 Mortality among children with wasting/severe wasting

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.12.1 RCTs						
Hussain 2021	✓	✓	✓	✓	✓	✓
Subgroup 1.12.2 Non-RCTs						
Alvarez Moran 2018	✗	~	✓	✓	✓	✗
Charle-Cuellar 2021	✗	~	✗	✓	✓	✗
Linneman 2007	✗	~	✓	✓	✓	✗
Ogobara Dougnon 2021	✗	~	✓	✓	✓	✗
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.13 Treatment coverage

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.13.1 Non-RCTs						
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.14 Default from care

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.14.1 RCTs						
Hussain 2021	✓	✓	✓	✓	✓	✓
Subgroup 1.14.2 Non-RCTs						
Alvarez Moran 2018	✗	~	✓	✓	✓	✗
Charle-Cuellar 2021	✗	~	✗	✓	✓	✗
Linneman 2007	✗	~	✓	✓	✓	✗
Ogobara Dougnon 2021	✗	~	✓	✓	✓	✗
Wilunda 2021	✗	~	✓	✓	✓	✗

Risk of bias for analysis 1.15 Transfer to another LHW site or health facility

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Subgroup 1.15.1 Non-RCTs						

	Bias					
Study	**Randomisation process**	**Deviations from intended interventions**	**Missing outcome data**	**Measurement of the outcome**	**Selection of the reported results**	**Overall**
Alvarez Moran 2018	✗	~	✓	✓	~	✗
Charle-Cuellar 2021	✗	~	✗	✓	~	✗
Ogobara Dougnon 2021	✗	~	✓	✓	✗	✗

DATA AND ANALYSES

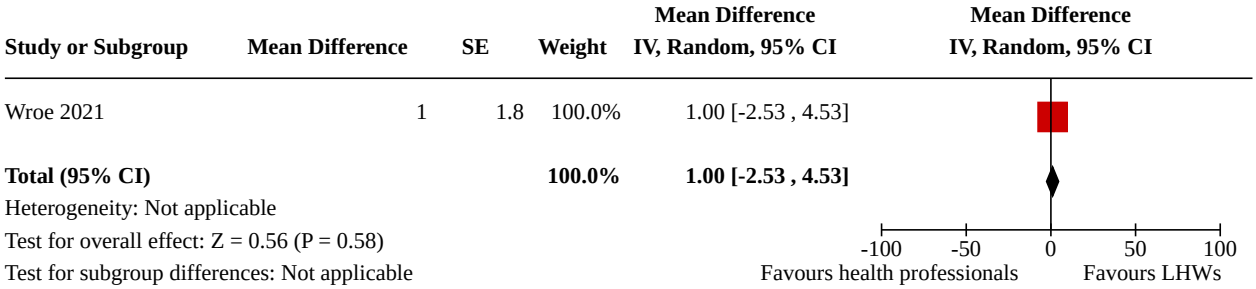
Comparison 1. Lay health workers (LHWs) or health professionals versus health professionals

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Anthropometric recovery: percentage of children aged 6–59 months who recovered from moderate or severe malnutrition	1		Mean Difference (IV, Random, 95% CI)	1.00 [-2.53, 4.53]
1.2 Anthropometric recovery	6		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.2.1 Improvement from severe wasting	1	789	Risk Ratio (IV, Random, 95% CI)	0.93 [0.86, 0.99]
1.2.2 Anthropometric recovery (multiple outcomes)	5	6688	Risk Ratio (IV, Random, 95% CI)	1.06 [1.00, 1.11]
1.3 Anthropometric recovery – sensitivity analysis (ICC = 0.05)	6		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.3.1 Improvement from severe wasting	1	789	Risk Ratio (IV, Random, 95% CI)	0.93 [0.77, 1.11]
1.3.2 Anthropometric recovery	5	6688	Risk Ratio (IV, Random, 95% CI)	1.05 [0.98, 1.12]
1.4 Non-response to treatment	4		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.4.1 RCTs	1	789	Risk Ratio (IV, Random, 95% CI)	1.44 [1.04, 2.01]
1.4.2 Non-RCTs	3	3807	Risk Ratio (IV, Random, 95% CI)	1.29 [0.93, 1.78]
1.5 Non-response to treatment – sensitivity analysis (ICC = 0.05)	4		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.5.1 RCTs	1	789	Risk Ratio (IV, Random, 95% CI)	1.44 [0.61, 3.43]

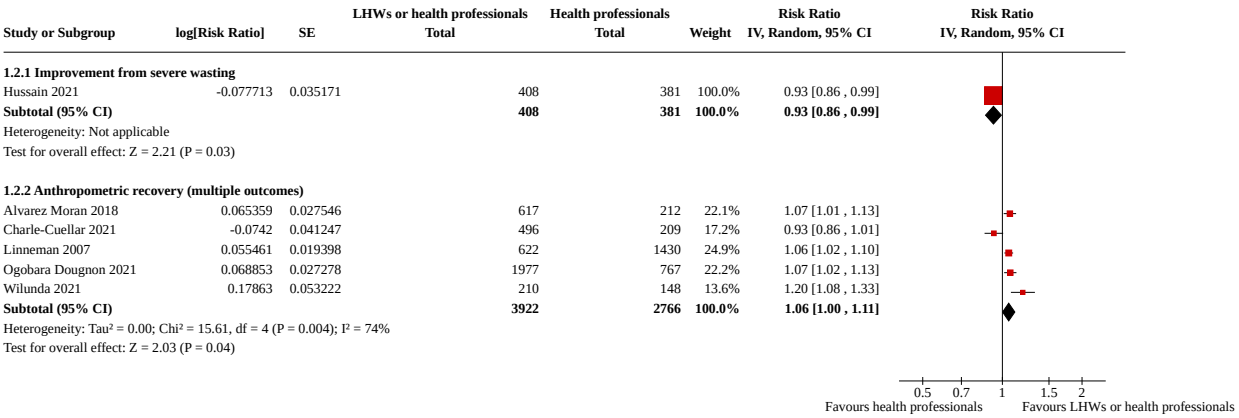
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.5.2 Non-RCTs	3	3807	Risk Ratio (IV, Random, 95% CI)	1.29 [0.77, 2.14]
1.6 Anthropometric outcomes: weight-for-height Z-score in normal or underweight range on discharge	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.6.1 Normal	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.7 Anthropometric outcomes: weight-for-height Z-score in moderate or severe wasting range on discharge	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.7.1 Moderate (WHZ between −3 and −2)	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.7.2 Severe (WHZ < −3)	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.8 Anthropometric outcomes: mid-upper arm circumference ≥ 115 mm on discharge	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.9 Anthropometric outcomes: weight gain per day (g/kg/day)	2		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.9.1 RCTs	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.9.2 Non-RCTs	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.10 Relapse	1		Risk Ratio (IV, Random, 95% CI)	Totals not selected
1.11 Transfer to inpatient care	5		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.11.1 RCTs	1	829	Risk Ratio (IV, Random, 95% CI)	3.71 [0.36, 38.23]
1.11.2 Non-RCTs	4	4739	Risk Ratio (IV, Random, 95% CI)	1.42 [1.04, 1.95]
1.12 Mortality among children with wasting/severe wasting	6		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.12.1 RCTs	1	829	Risk Ratio (IV, Random, 95% CI)	0.46 [0.04, 5.98]
1.12.2 Non-RCTs	5	6688	Risk Ratio (IV, Random, 95% CI)	0.89 [0.56, 1.44]
1.13 Treatment coverage	1		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.13.1 Non-RCTs	1	445	Risk Ratio (IV, Random, 95% CI)	1.94 [1.62, 2.32]
1.14 Default from care	6		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.14.1 RCTs	1	829	Risk Ratio (IV, Random, 95% CI)	1.48 [0.65, 3.40]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.14.2 Non-RCTs	5	6688	Risk Ratio (IV, Random, 95% CI)	0.57 [0.40, 0.82]
1.15 Transfer to another LHW site or health facility	3		Risk Ratio (IV, Random, 95% CI)	Subtotals only
1.15.1 Non-RCTs	3	4381	Risk Ratio (IV, Random, 95% CI)	1.67 [1.04, 2.68]

Analysis 1.1. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 1: Anthropometric recovery: percentage of children aged 6–59 months who recovered from moderate or severe malnutrition

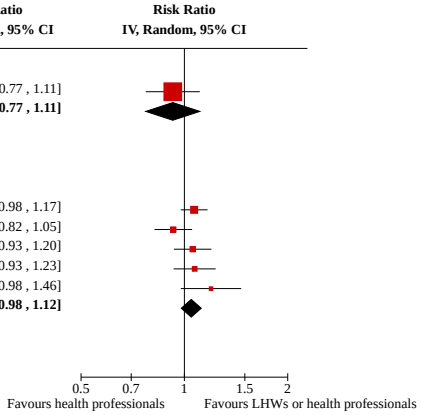


Analysis 1.2. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 2: Anthropometric recovery



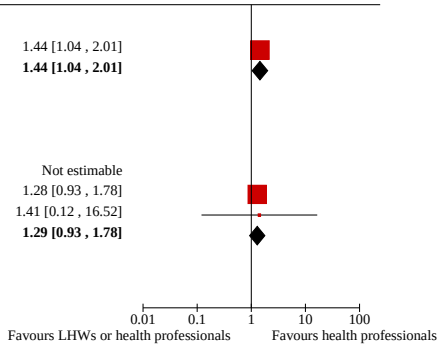
Analysis 1.3. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 3: Anthropometric recovery – sensitivity analysis (ICC = 0.05)

Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.3.1 Improvement from severe wasting						
Hussain 2021	-0.077713	0.092458	408	381	100.0%	0.93 [0.77 , 1.11]
Subtotal (95% CI)			**408**	**381**	**100.0%**	**0.93 [0.77 , 1.11]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.84 (P = 0.40)						
1.3.2 Anthropometric recovery						
Alvarez Moran 2018	0.065359	0.046011	617	212	31.9%	1.07 [0.98 , 1.17]
Charle-Cuellar 2021	-0.0742	0.064282	496	209	20.6%	0.93 [0.82 , 1.05]
Linneman 2007	0.055461	0.064253	622	1430	20.6%	1.06 [0.93 , 1.20]
Ogobara Dougnon 2021	0.068853	0.07196	1977	767	17.4%	1.07 [0.93 , 1.23]
Wilunda 2021	0.17863	0.103188	210	148	9.6%	1.20 [0.98 , 1.46]
Subtotal (95% CI)			**3922**	**2766**	**100.0%**	**1.05 [0.98 , 1.12]**
Heterogeneity: Tau² = 0.00; Chi² = 5.45, df = 4 (P = 0.24); I² = 27%						
Test for overall effect: Z = 1.35 (P = 0.18)						



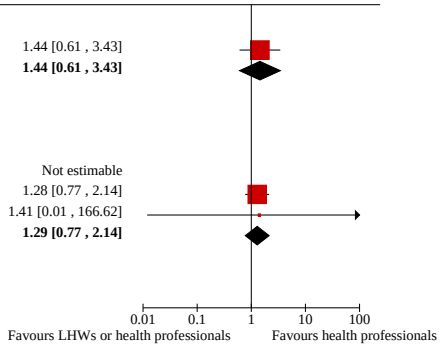
Analysis 1.4. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 4: Non-response to treatment

Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.4.1 RCTs						
Hussain 2021	0.36685	0.168173	408	381	100.0%	1.44 [1.04 , 2.01]
Subtotal (95% CI)			**408**	**381**	**100.0%**	**1.44 [1.04 , 2.01]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.18 (P = 0.03)						
1.4.2 Non-RCTs						
Charle-Cuellar 2021	0	0	496	209		Not estimable
Ogobara Dougnon 2021	0.250435	0.167149	1977	767	98.3%	1.28 [0.93 , 1.78]
Wilunda 2021	0.343252	1.255903	210	148	1.7%	1.41 [0.12 , 16.52]
Subtotal (95% CI)			**2683**	**1124**	**100.0%**	**1.29 [0.93 , 1.78]**
Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.94); I² = 0%						
Test for overall effect: Z = 1.52 (P = 0.13)						



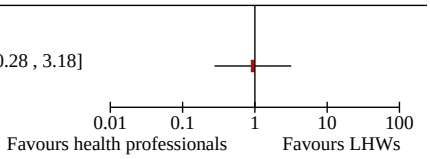
Analysis 1.5. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 5: Non-response to treatment – sensitivity analysis (ICC = 0.05)

Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.5.1 RCTs						
Hussain 2021	0.36685	0.44209	408	381	100.0%	1.44 [0.61 , 3.43]
Subtotal (95% CI)			**408**	**381**	**100.0%**	**1.44 [0.61 , 3.43]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.83 (P = 0.41)						
1.5.2 Non-RCTs						
Charle-Cuellar 2021	0	0	496	209		Not estimable
Ogobara Dougnon 2021	0.250435	0.260497	1977	767	98.9%	1.28 [0.77 , 2.14]
Wilunda 2021	0.343252	2.434977	210	148	1.1%	1.41 [0.01 , 166.62]
Subtotal (95% CI)			**2683**	**1124**	**100.0%**	**1.29 [0.77 , 2.14]**
Heterogeneity: Tau² = 0.00; Chi² = 0.00, df = 1 (P = 0.97); I² = 0%						
Test for overall effect: Z = 0.97 (P = 0.33)						



Analysis 1.6. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 6: Anthropometric outcomes: weight-for-height Z-score in normal or underweight range on discharge

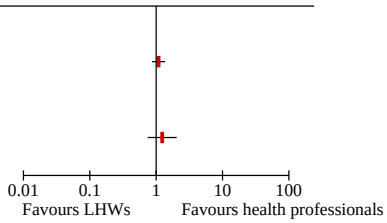
Study or Subgroup	log[Risk Ratio]	SE	LHWs Total	Health professionals Total	Risk Ratio IV, Random, 95% CI	Risk Ratio IV, Random, 95% CI
1.6.1 Normal						
Hussain 2021 (1)	-0.064222	0.623353	408	381	0.94 [0.28 , 3.18]	



Footnotes
(1) RCT

Analysis 1.7. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 7: Anthropometric outcomes: weight-for-height Z-score in moderate or severe wasting range on discharge

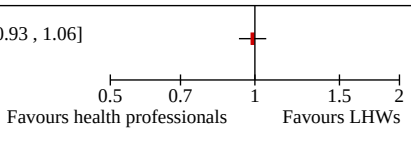
Study or Subgroup	log[Risk Ratio]	SE	LHWs Total	Health professionals Total	Risk Ratio IV, Random, 95% CI	Risk Ratio IV, Random, 95% CI
1.7.1 Moderate (WHZ between −3 and −2)						
Hussain 2021 (1)	0.083082	0.115974	408	381	1.09 [0.87 , 1.36]	
1.7.2 Severe (WHZ < −3)						
Hussain 2021 (1)	0.210246	0.256077	408	381	1.23 [0.75 , 2.04]	



Footnotes
(1) RCT

Analysis 1.8. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 8: Anthropometric outcomes: mid-upper arm circumference ≥ 115 mm on discharge

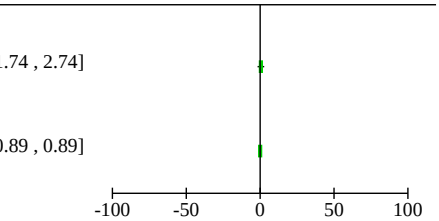
Study or Subgroup	log[Risk Ratio]	SE	LHWs Total	Health professionals Total	Risk Ratio IV, Random, 95% CI	Risk Ratio IV, Random, 95% CI
Hussain 2021 (1)	-0.010963	0.033397	408	381	0.99 [0.93 , 1.06]	



Footnotes
(1) RCT

Analysis 1.9. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 9: Anthropometric outcomes: weight gain per day (g/kg/day)

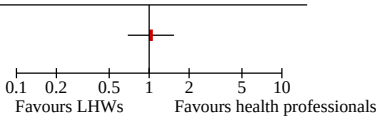
Study or Subgroup	LHWs Mean	LHWs SD	LHWs Total	Health professionals Mean	Health professionals SD	Health professionals Total	Mean Difference IV, Random, 95% CI	Mean Difference IV, Random, 95% CI
1.9.1 RCTs								
Hussain 2021 (1)	5.3	13.5	284	4.8	13.8	287	0.50 [-1.74 , 2.74]	
1.9.2 Non-RCTs								
Wilunda 2021 (1)	6.3	3.9	198	6.3	4.3	145	0.00 [-0.89 , 0.89]	



Footnotes
(1) sample size has been reduced to account for clustering

Analysis 1.10. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 10: Relapse

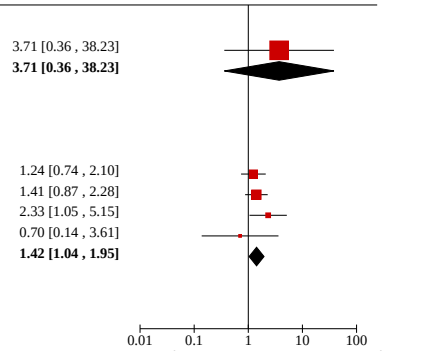
Study or Subgroup	log[Risk Ratio]	SE	LHWs Total	Health professionals Total	Risk Ratio IV, Random, 95% CI
Hussain 2021 (1)	0.030751	0.204712	323	326	1.03 [0.69 , 1.54]



Footnotes
(1) RCT

Analysis 1.11. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 11: Transfer to inpatient care

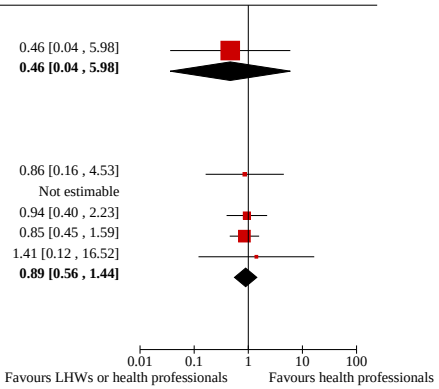
Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.11.1 RCTs						
Hussain 2021	1.311471	1.189943	430	399	100.0%	3.71 [0.36 , 38.23]
Subtotal (95% CI)			**430**	**399**	**100.0%**	**3.71 [0.36 , 38.23]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.10 (P = 0.27)						
1.11.2 Non-RCTs						
Alvarez Moran 2018 (1)	0.217023	0.267593	698	234	36.6%	1.24 [0.74 , 2.10]
Charle-Cuellar 2021	0.344719	0.244684	496	209	43.7%	1.41 [0.87 , 2.28]
Ogobara Dougnon 2021	0.84491	0.404925	1977	767	16.0%	2.33 [1.05 , 5.15]
Wilunda 2021	-0.349895	0.83321	210	148	3.8%	0.70 [0.14 , 3.61]
Subtotal (95% CI)			**3381**	**1358**	**100.0%**	**1.42 [1.04 , 1.95]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.45$, df = 3 (P = 0.48); $I^2 = 0\%$						
Test for overall effect: Z = 2.17 (P = 0.03)						



Footnotes
(1) Denominators used are number enrolled

Analysis 1.12. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 12: Mortality among children with wasting/severe wasting

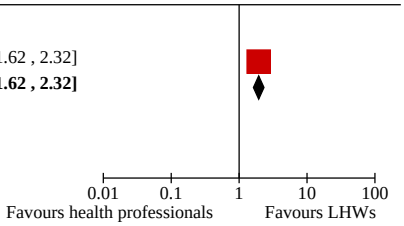
Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.12.1 RCTs						
Hussain 2021	-0.76797	1.303939	430	399	100.0%	0.46 [0.04 , 5.98]
Subtotal (95% CI)			**430**	**399**	**100.0%**	**0.46 [0.04 , 5.98]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.59 (P = 0.56)						
1.12.2 Non-RCTs						
Alvarez Moran 2018	-0.151992	0.848507	617	212	8.2%	0.86 [0.16 , 4.53]
Charle-Cuellar 2021	0	0	496	209		Not estimable
Linneman 2007	-0.061328	0.440082	622	1430	30.3%	0.94 [0.40 , 2.23]
Ogobara Dougnon 2021 (1)	-0.16409	0.318779	1977	767	57.8%	0.85 [0.45 , 1.59]
Wilunda 2021	0.343252	1.255903	210	148	3.7%	1.41 [0.12 , 16.52]
Subtotal (95% CI)			**3922**	**2766**	**100.0%**	**0.89 [0.56 , 1.44]**
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.17$, df = 3 (P = 0.98); $I^2 = 0\%$						
Test for overall effect: Z = 0.47 (P = 0.64)						



Footnotes
(1) The authors informed us that the number of deaths in the intervention group was 35, not 38 as reported. We used n=35 in our calculations.

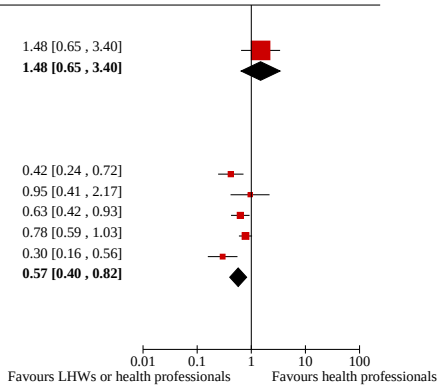
Analysis 1.13. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 13: Treatment coverage

Study or Subgroup	log[Risk Ratio]	SE	LHWs Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.13.1 Non-RCTs						
Wilunda 2021	0.663671	0.091157	241	204	100.0%	1.94 [1.62 , 2.32]
Subtotal (95% CI)			**241**	**204**	**100.0%**	**1.94 [1.62 , 2.32]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 7.28 (P < 0.00001)						



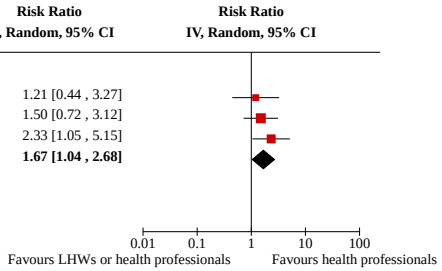
Analysis 1.14. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 14: Default from care

Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.14.1 RCTs						
Hussain 2021	0.39518	0.423432	430	399	100.0%	1.48 [0.65 , 3.40]
Subtotal (95% CI)			**430**	**399**	**100.0%**	**1.48 [0.65 , 3.40]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.93 (P = 0.35)						
1.14.2 Non-RCTs						
Alvarez Moran 2018	-0.871572	0.274986	617	212	19.2%	0.42 [0.24 , 0.72]
Charle-Cuellar 2021	-0.053311	0.423053	496	209	12.1%	0.95 [0.41 , 2.17]
Linneman 2007	-0.469247	0.200668	622	1430	24.1%	0.63 [0.42 , 0.93]
Ogobara Dougnon 2021	-0.247144	0.14269	1977	767	28.1%	0.78 [0.59 , 1.03]
Wilunda 2021	-1.218933	0.321698	210	148	16.6%	0.30 [0.16 , 0.56]
Subtotal (95% CI)			**3922**	**2766**	**100.0%**	**0.57 [0.40 , 0.82]**
Heterogeneity: Tau² = 0.10; Chi² = 10.96, df = 4 (P = 0.03); I² = 63%						
Test for overall effect: Z = 3.04 (P = 0.002)						



Analysis 1.15. Comparison 1: Lay health workers (LHWs) or health professionals versus health professionals, Outcome 15: Transfer to another LHW site or health facility

Study or Subgroup	log[Risk Ratio]	SE	LHWs or health professionals Total	Health professionals Total	Weight	Risk Ratio IV, Random, 95% CI
1.15.1 Non-RCTs						
Alvarez Moran 2018 (1)	0.188036	0.509237	698	234	22.5%	1.21 [0.44 , 3.27]
Charle-Cuellar 2021	0.40427	0.373673	496	209	41.8%	1.50 [0.72 , 3.12]
Ogobara Dougnon 2021 (2)	0.84491	0.404925	1977	767	35.6%	2.33 [1.05 , 5.15]
Subtotal (95% CI)			**3171**	**1210**	**100.0%**	**1.67 [1.04 , 2.68]**
Heterogeneity: Tau² = 0.00; Chi² = 1.16, df = 2 (P = 0.56); I² = 0%						
Test for overall effect: Z = 2.12 (P = 0.03)						



Footnotes

(1) Denominators used are number enrolled

(2) We confirmed with the authors that the number of internally transfered participants in the intervention group was 48.

ADDITIONAL TABLES

Table 1. Diagnostic criteria and classification of wasting for children aged five years or under

Clinical measure	Classification	
	Moderate	Severe

Table 1. Diagnostic criteria and classification of wasting for children aged five years or under *(Continued)*

MUAC	115 mm to 124 mm	< 115 mm
WHZ	< −2 and ≥ −3	< −3
Bilateral oedema	No	Yes

MUAC: mid-upper arm circumference, WHZ: weight-for-height Z-score.

Table 2. Table of characteristics of included studies

Primary citation (country), funding, trial registration	Study design	Study setting (study period)	Participant inclusion criteria	Exclusion criteria	Intervention setting	Intervention description (type) and comparison	LHW background	Outcomes
Alvarez Moran 2018 (Mali) Related citations: Lopez-Ejeda 2020 Rogers 2018 Funding: The Innocent Foundation Trial registration: ISRCTN33578874	Cluster-RCT with 1 cluster per arm	Kita District, 60% low-medium SES (February 2015 to February 2016)	Children 6 months to 59 months of age with MUAC < 115 mm, bilateral oedema or WHZ < −3	Complications requiring inpatient admission, residence outside study areas	Outpatient	Intervention name (type): iCCM Plus (treatment) Content of intervention: RUTF, amoxicillin, albendazole, vitamin A, monitoring, referral of participants with complicated SAM for inpatient care, active community screening every 3 months and passive screening throughout Intervention duration and frequency: followed up weekly until discharge Comparison: diagnosis and treatment of SAM as an outpatient by doctors and nurses at 4 health facilities; screening by LHWs and community volunteers	Delivered by: health professionals in 3 health facilities, or 17 LHWs. 79.0% of participants were treated by LHWs at the time of admission. Selection and educational background: Most CHWs had at least secondary school education. Most were midwives. Training: trained for 2 weeks on iCCM and CMAM and received refresher training 6 months into the study Supervision: supervised twice a month by Action Against Hunger staff and 3 monthly by National Institute for Research in Public Health Remuneration: LHWs were salaried workers	• Anthropometric recovery • Default from care • Mortality among children with wasting • Referred to hospital on the first day • Treatment coverage • Quality of care • Cost-effectiveness (At baseline and on discharge)
Charle-Cuellar 2021 (Mauritania) Funding: US Agency for Internation-	Non-randomised cluster-controlled trial	Agropastoral region of Guidimakha Most families live in homes with-	Children 6 months to 59 months of age who either presented to a health facility or a	Severe oedema, other medical conditions, failed appetite test	Community-based	Intervention name (type): integration of SAM treatment into iCCM package (treatment) Content of intervention: RUTF (170 kcal/kg/d) to be used at home, amoxicillin 50 to 100 mg/kg/d × 5 d, 500 mg meben-	Delivered by: health professionals in 10 health facilities or 12 LHWs. 20.7% of participants were treated by LHWs at the time of admission.	• Anthropometric recovery • Default from care • Non-response

Table 2. Table of characteristics of included studies *(Continued)*

al Development, Action Against Hunger Trial registration: none		out cement floors or potable water in the house. (November 2018 to July 2019)	LHW's site or were detected by community volunteers of mobile clinics with mild or moderate oedema, MUAC < 115 mm or WHZ < −3 or both			dazole once, monitoring, referred when showing severe signs of illness, persistent oedema, absence of weight gain after 21 d (participants without oedema), weight loss. Intervention duration and frequency: followed up weekly until MUAC > 125 mm or WHZ > 1.5 or both Comparison: treatment for SAM as an outpatient by health professionals at 6 health facilities	Selection and educational background: not reported Training: trained for 21 d on basic health assistance package of iCCM including health promotion, IYCF practices and treatment of acute malnutrition Supervision: periodic supportive supervision by healthcare staff from health facility and Action Against Hunger supervisors Remuneration: not reported	to treatment • Length of stay • Number of RUTF sachets received during treatment • Treatment coverage (At baseline and after intervention)
Hussain 2021 (Pakistan) Funding: Innocent Foundation through Action Against Hunger (ACF) International Trial registration: NCT03043352	Cluster-RCT	Rural Pakistan, where less than half of households had improved water facilities (April 2015 to July 2016)	Children 6 months to 59 months of age with MUAC < 115 mm with appetite	Medical complications, failed appetite test	Health houses	Intervention name (type): CMAM (treatment) Content of intervention: managed at home with weekly rations of RUTF, antibiotics and folic acid. Participants with complicated SAM were identified and referred for inpatient care. Mothers and caretakers were counselled on IYCF practices. Intervention duration and frequency: followed up weekly until MUAC > 125 mm Comparison: treatment for SAM by a CMAM nurse at the nearest health facility or satellite site, after identification and referral by 1 of 72 trained lady health workers	Delivered by: 72 lady health workers Selection and educational background: minimum 8th grade formal education, 2 years' training in family planning and basic child health Training: trained for 3 days on CMAM protocols, 4 d on SAM case management and IYCF, and 2 days on supply management and a refresher 3 to 6 months after initial training Supervision: supervised by lady health worker supervisors monthly and by Action Against Hunger nurses twice-weekly	• Anthropometric recovery • Prevalence of malnutrition • Relapse • Default from care • Cost-effectiveness (At baseline and after intervention)

Table 2. Table of characteristics of included studies *(Continued)*

							Remuneration: usual lady health worker allowance	
Linneman 2007 (Malawi) Funding: UNICEF and World Food Program Trial registration: none	Non-randomised cluster-controlled trial	Malawi, mostly rural Families typically lived in mud huts and collected water from a well. (May 2005 to May 2006)	Children 6 months to 60 months of age with WHZ 70% to 85% or < 70%, or presence of oedema, good appetite	Severe oedema, anorexia	Home-based treatment administered at a rural health centre or mission hospital	Intervention name (type): home-based RUTF (treatment) Content of intervention: RUTF (175 kcal/kg/d with protein 5.3 g/kg/d) and micronutrients per WHO recommendations, monitoring Intervention duration and frequency: followed up twice weekly for 8 weeks or when WHZ > 0, relapsed requiring inpatient admission or death Comparison: home-based treatment by medical professionals from 2 rural health centres, 2 mission hospitals or 1 district hospital	Delivered by: community health aides from 2 rural centres and 1 mission hospital Selection and educational background: not reported Training: trained for 1 month, including working with nurse trainers for 2 d Supervision: supervised through monthly problem-solving and retraining visits by nurse trainers monthly Remuneration: not reported	• Anthropometric recovery • Failure/Non-response to treatment • Mortality among children with severe wasting • Default • Anthropometric outcomes: weight gain per day • Anthropometric outcomes: MUAC growth per day • Anthropometric outcomes: statural growth rate (At baseline and after intervention)
Ogobara Dougnon 2021	Non-randomised	Rural communes in Mayahi	Children 6 months to 59 months	Severe oedema, medical	Health huts or health facilities	Intervention name (type): integration of SAM treatment into	Delivered by: nurses in 6 health facilities, or 10 LHWs. 39.2% of partic-	• Anthropometric recovery

Table 2. Table of characteristics of included studies *(Continued)*

(Niger) Funding: Office of US Foreign Disaster Assistance Trial registration: ISRCTN31143316	cluster-controlled trial	health district – Most lived in homes without a cement floor, and less than half had potable water in the house. (June 2018 to March 2019)	of age with MUAC < 115 mm or bilateral oedema or WHZ < −3	complications, failed appetite test, residence outside the study areas		care provided by LHWs (treatment) Content of intervention: RUTF (170 kcal/kg/d) to be used at home, monitoring Intervention duration and frequency: followed up weekly until MUAC > 125 mm or WHZ > 1.5 or both Comparison: treatment for SAM by health professionals at 1 of 4 health facilities	ipants were treated by LHWs. Selection and educational background: All LHWs had formal health education. Training: LHWs were trained for 4 d in the management of SAM. LHWs were employed by the prefecture or through local contracts. Supervision: not reported Remuneration: not reported	• Default from care • Mortality among children with severe wasting • Anthropometric outcomes: WHZ • Anthropometric outcomes: MUAC • Treatment coverage (At baseline and after intervention)
Wilunda 2021 (Tanzania) Funding: Children's Investment Fund Foundation Trial registration: PACTR201901856648139	Non-randomised cluster-controlled trial	6 rural wards in Simiyu region, northern Tanzania 12.4% to 34.3% of participants in the lowest quintile of household wealth (August 2018 to December 2019)	Children 6 months to 59 months of age with MUAC < 115 mm or mild/moderate oedema, good appetite	Severe oedema, underlying medical conditions or complications	Community-based settings and participants' homes	Intervention name (type): integrated promotion of nutrition, growth and development (treatment) Content of intervention: RUTF with dosage based on body weight, monitoring, screening Intervention duration and frequency: followed up weekly until one of the study outcomes was reached Comparison: treatment for SAM by health professionals at health centre after screening and enrolment by 11 trained LHWs. Caretakers could also self-refer	Delivered by: 13 LHWs Selection and educational background: not reported Training: trained to screen and manage children with SAM in the community Supervision: supervised by programme staff and health facility staff Remuneration: LHWs received incentives	• Anthropometric recovery • Default from care • Non-response to treatment • Transfer to inpatient care facility • Mortality among children with severe wasting • Length of treatment • Anthropometric outcomes: av-

Table 2. Table of characteristics of included studies *(Continued)*

						erage weight gain • Treatment coverage • Cost-effectiveness (At baseline and after intervention)		
Wroe 2021 (Malawi) Funding: none declared Trial registration: NCT03106727	Stepped-wedge cluster-randomised trial	Neno District in rural Malawi Impoverished (September 2016 to November 2018)	All children resident of 1 of the 11 catchment areas, seeking routine care from a health facility in Neno District	None mentioned	Home	Intervention name (type): Household Model (identification and referral) Content of intervention: LHWs visited households each month and performed education and screening for STDs, TB, HIV and paediatric malnutrition, enrolment of pregnant women into antenatal care, and referral or accompaniment to the clinic. Intervention duration and frequency: monthly household visits throughout the study Comparison: LHWs made daily visits to participants' homes with HIV or TB or both with monitoring of medication adherence and side effects and accompaniment to clinic visits	Delivered by: 935 LHWs Selection and educational background: able to read and write, live in the village they serve Training: 5 d on foundational topics; senior LHWs trained for 2 additional days on mentorship and supervision Supervision: LHWs were supervised by senior LHWs monthly, and senior LHWs were supervised by facility-based site supervisors. Remuneration: LHWs received a monthly stipend	(Relevant to review) • Paediatric malnutrition case finding • Anthropometric recovery from paediatric malnutrition • Enrolment into nutritional rehabilitation unit (At baseline and end line)

CHW: community health worker; CMAM: community management of acute malnutrition; iCCM: integrated community case management; IYCF: infant and young child feeding; LHW: lay health worker; MUAC: mid-upper arm circumference; RCT: randomised controlled trial; RUTF: ready-to-use therapeutic food; SAM: severe acute malnutrition; SES: socioeconomic status; STD: sexually transmitted diseases; TB: tuberculosis; UNICEF: United Nations Children's Fund; WHO: World Health Organization; WHZ: weight-for-height Z-score.

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis

Primary citation (country), related citations	Study design	Study setting (study period)	Participant inclusion criteria	Exclusion criteria	Intervention setting	Intervention description and comparison	Health worker background	Outcomes (time points)
Adesoro 2021 (Niger)	Repeated-measures (pre-post) single-group using retrospective cohort data extracted from electronic records (no control or comparison group)	Mariga and Rijau, 2 of the 6 local government areas in Niger state where iCCM was being implemented and where there was an estimated prevalence of SAM of 10%. Most families in these communities are poor and illiterate and lack access to basic social amenities and health care. (July 2017 and May 2018)	Children < 5 years of age attending the iCCM programme who were screened to fall in the severe 'malnutrition zone' of the MUAC (red or pink) measure and did not have any iCCM danger signs and passed the appetite test	Children with iCCM danger signs or who failed the appetite test were referred to appropriate health facilities for treatment	Home-based (unless referred to health facilities)	Upon enrolment, CORPs administered amoxicillin and albendazole to each participant with SAM according to a simplified protocol. RUTF doses required per day were determined using a Salter scale overlaid with a dosage chart, and a 7-day dosage was calculated using a simplified calculator. Using a flip chart, CORPs counselled caregivers on how to administer the RUTF and other medications at home, adhere to the daily dosage, maintain good hygiene, and return the following week to continue treatment, unless the condition of the child got worse before the next appointment. Each encounter with a participant with SAM was recorded in a register. CORPs followed up defaulting enrolees with home visits, recorded children's progress every week and discharged as appropriate based on possible outcomes. The maximum treatment period for any admitted case was 12 weeks	Nonclinical LHWs (called CORPs). Most were male and aged 18 to 35 years. Many reported they had senior secondary level education (not verified), could read without any difficulty, and had worked as CORPs for 3 to 4 years	• Recovery • Defaulted • Non-response • Mortality • Number of weeks in treatment (Baseline and 12 weeks or discharge)
Amthor 2009 (Malawi)	Repeated-measures (pre-post) single-group prospective cohort study	Machinga District, a rural area > 50 km from the closest healthcare facility	Children aged 6 months to 60 months presenting to 1 of 5	Children with a poor appetite or severe oedema were deemed in-	Home-based therapy with RUTF administered by village health aides	Health aides recorded basic information, including history of fever, cough, diarrhoea, oedema, vomiting, skin sores, appetite, irritability and hair colour change. Caretakers and children returned every 2 weeks for monitoring. At each visit, the child received a 2-week supply of RUTF (provided	Village health aides were embedded in the community and trained over	• Recovery • Continued malnourishment • Default • Mortality

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

	(no control or comparison group)	(2006 Malawi famine when there was a food aid crisis). The entire programme setup and training of village health aides was achieved in 10 days. (Participant recruitment March to July 2006)	OTP centres in Machinga District between March and July 2006 with severe malnutrition (defined as the presence of oedema, or WHZ < 70%) according to the 2006 WHO reference standard and with adequate appetite	eligible to begin outpatient care and were excluded from the project and referred for inpatient treatment		by Project Peanut Butter). The caretaker was asked to feed the child the RUTF 7 to 10 times per day with a spoon. Children were discharged after 8 weeks or earlier if they achieved a weight that was 100% or more of the WHO reference standard or if they required admission to the hospital owing to recurrence of oedema or clinical deterioration	5 × 1-hour didactic sessions and by shadowing 2 senior clinical nurses from the College of Medicine	• Weight gain (g/kg/d) after 4 weeks of treatment • MUAC gain (mm/day) after 4 weeks of treatment • Height gain (mm/day) over the entire duration of treatment • WHZ • WAZ • HAZ (Baseline and 8 weeks or discharge)
Chanani 2019 (India) Related citations: Goudet 2018; Shah More 2018	Repeated-measures (pre-post) single-group using retrospective cohort data extracted from electronic records (no control or comparison group)	Urban informal settlements in Dharavi, India (Participant recruitment May 2014 to April 2015)	Children aged < 3 years with and without wasting who were admitted into the child nutrition programmes in Dharavi between 1 May 2014 and 30 April 2015	Children without moderate or severe malnutrition were included in prevention activities only	Anganwadi centres, home visits by LHWs and AWWs, and medical care at health camps	All children aged < 3 years were screened for wasting. All children received prevention interventions, and children with uncomplicated moderate or severe wasting entered the treatment group for LHW home visits and referral to community-based health camps. Doctors at the health camps confirmed the wasting status, prescribed antibiotics if required, and referred children to appropriate public health facilities. MNT, a locally produced nutrient-dense lipid-based paste, was given in prepackaged cups to children older than 6 months with severe wasting or medical complications and who passed an appetite test. LHWs provided regular doorstep delivery of the MNT cups	AWWs and SNEHA NGO LHWs – AWWs cover all children aged < 6 years; SNEHA staffed additional LHWs to focus on children aged < 3 years	• Mean weight gain (g/kg/d) • Recovery • Non-response • Faltering • Default • DALYs, costs, estimated cost per DALY averted (Baseline and end of treatment (3

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

								months after baseline))
Dani 2017 (India) Related citation: Dani 2016	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	A tribal area of Melghat, Maharashtra, India (2012 to 2015)	Children aged 6 months to 60 months with SAM (WHZ ≤ −3) with or without bilateral oedema, or severely underweight (WAZ ≤ −3), or IAP Grade III or IV (IAP Grade III: 50% to 60% of expected weight)	Children with medical complications such as fever, diarrhoea, acute respiratory tract infection, malaria, urinary tract infections, otitis media, tuberculosis, lethargy or oedema were referred to a hospital, but those who refused hospitalisation were enrolled after giving high-risk consent	Community-based feeding centres	VHWs provided children with LTF-MN, antimicrobials (amoxicillin, albendazole) and BCC for 90 days. VHWs performed anthropometry weekly for 12 weeks. BCC (hygiene and nutrition education) of parents was through counselling, flip charts, audiovisual aids, demonstrations and street plays. LTF-MN was prepared by local tribal women from local produce in the form of 7 palatable dishes. Each participant was fed LTF-MN 4 times a day under the direct supervision of VHWs for 90 days. Measles vaccination and 6-monthly vitamin A were provided through a national programme	VHWs were local tribal, married women. Most were semiliterate. VHWs received 4 days of training (with refreshers) in anthropometric assessment, feeding of LTF-MN, treatment of infectious diseases and BCC through health education	• Recovery • Relapse • Episodes of infections • Dropouts • Defaults • Mortality (Baseline, end of treatment (3 months after baseline) and 3 years after baseline)
Kozuki 2020 (South Sudan) Related citation: Van Boetzelaer 2019	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	Aweil South County, Northern Bahr El Ghazal State, South Sudan (March to September 2017)	Children aged 6 months to 59 months with uncomplicated SAM (MUAC 90 to < 115 mm)	Children with MUAC < 90 mm, or who failed the appetite test, or who weighed < 4 kg were immediately referred to the OTP out of concern for severity	Community-based distributors' homes	The treatment protocol consisted of danger sign screening, MUAC measurement, administration of an appetite test, weight measurement, determination of daily and weekly RUTF dosage based on weight, drug provision (amoxicillin on week 1, albendazole on week 2) and counselling. Caregivers were instructed to return weekly for up to 16 weeks until reaching a treatment outcome: recovered (2 consecutive weeks with MUAC ≥ 125 mm, or the green zone on the MUAC tape), default (3 consecutive missed visits), nonresponse (had not recovered by 16 weeks), death or referred.	iCCM delivered by low-literate and low-numerate CBDs (n = 44)	• Recovery (SAM to MAM) • Recovery (SAM to full recovery) • Default rate • Non-response • Mortality • Referral rate

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

						Referrals were made if the child presented with clinical danger signs or MUAC dropped below 90 mm. As CBDs are unable to differentiate slow regression, static or slow progression, children who stayed in the same MUAC colour zone for 4 consecutive weeks were also referred		(Baseline and 16 weeks or discharge)
Lal 1982 (India)	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	9 rural villages in India (July 1979 to October 1980)	Children aged < 6 years with severe malnourishment (weighing < 60% of the Harvard percentile on Harvard weight charts)	Not described	Anganwadi centres (n = 20) as part of the Integrated Child Development Scheme and home visits	The AWWs identified severely malnourished children. Every week, the AWWs weighed the children and recorded the grade, receipt of therapeutic nutrition, illness experience of the child during the past week, treatment at the first contact and accounts of the referrals (to medical officer, multipurpose health worker (female) and health supervisors). The package of services included therapeutic nutrition (Balamul 200 g/day, yielding 700 calories and 30 g of protein), immunisation, therapeutic and prophylactic nutrients, medical care, preschool education and nutrition and health education at home and at the Anganwadi centre	AWWs	• Incidence of severe malnutrition • Improved nutrition grade • Maintained nutrition grade • Deteriorated from Grade 3 to Grade 4 • Mortality • Time of conversion from one grade to another (Measured weekly for 66 weeks)
Puett 2013 (Bangladesh) Related citation: Puett 2013b	Non-RCT (1 group per arm)	2 neighbouring Upazilas in Barisal division, Bhola District, Southern Bangladesh (June 2009 to April 2010)	Children aged 6 months to 36 months with uncomplicated SAM (MUAC < 110 mm or presence of oedema or both)	SAM with complications (absent or poor appetite or severe illness or both) was referred for inpatient treatment	Outpatient clinic and home visits	Intervention group: Children aged < 3 years were screened for SAM. Those with complications were sent for inpatient care. The rest and those who recovered from complications were visited at home weekly, given RUTF (Plumpynut, Nutriset, Malaunay, France) every week, providing 175 to 200 kcal/kg/day and 4 to 5 g protein/kg/day, and monitored with MUAC and weight measurements until recovery (MUAC > 110 mm, at least 15%	LHWs were selected by Save the Children (US) (SCUS) based on an examination score assessing literacy and numeracy, choosing	• Recovery rate • Default • Non-response • Refuse referral • Mortality • Correct management of

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

	weight gain or resolution of oedema for 2 consecutive weeks). Medical treatment with a single oral dose of folic acid 5 mg and antibiotic cotrimoxazole (trimethoprim 5 mg/kg and sulphamethoxazole 25 mg/kg) twice daily for 5 days Comparison group: Children were screened during monthly growth monitoring and promotion sessions and at household visits for routine counselling and treatment of acute respiratory infection and diarrhoea. Children identified as having SAM were referred to the Upazila health complex for inpatient treatment. Those who did not receive inpatient treatment because of refusal, default or limited beds accessed outpatient care from other sources such as village doctors or pharmacists	the candidate with the highest score in her area. Educational backgrounds of the LHWs ranged from primary to graduate, with 54.3% completing up to lower secondary education	SAM, including assessment and education messages (QOC checklist) • Cost-effectiveness ratios: costs per child treated and recovered and costs per DALY averted QOC checklist: • Type of participant (new or follow-up) • MUAC measurement • Oedema check • SAM diagnosis • Appetite check • Antibiotic, folic acid, RUTF provided according to protocol • Delivery of educational messages	

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

Somasse 2013 (Burkina Faso)	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	9 provinces (Yatenga, Seno, Oudalan, Soum, Yagha, Bougouriba, Ioba, Noumbiel, Poni). 20 villages from each province were selected based on their high prevalence of acute malnutrition, low performance of the primary health centre and the unavailability of any humanitarian assistance. (June 2007 to December 2009)	Children aged < 5 years and pregnant and lactating women with uncomplicated SAM (MUAC < 110 mm or bilateral pitting oedema) or MAM (110 mm ≤ MUAC < 125 mm)	Women and children with complications were transferred to the health centre or a therapeutic feeding centre in case of life-threatening complications of malnutrition. Children and women who did not achieve the discharge criteria after 12 weeks were transferred to the health centre	Nutrition centre in village and homes	Door-to-door case-finding to identify children, pregnant and lactating women with moderate or severe malnutrition. LHWs held weekly nutrition meetings at the nutrition centre (built by villagers) involving education, treatment and monitoring, and home visits. Treatment included medications (1 dose of vitamin A, mebendazole or albendazole, iron and folate tablets, and antibiotic for SAM), RUTF (175 kcal/kg/day) in cases of SAM and corn-soy blend flour (1400 g) mixed with 140 g oil and 105 g sugar weekly (1000 kcal/day) in cases of MAM. Children were discharged when WHZ index > 85% of the median reference of National Centre for Health Statistics standard growth charts. Pregnant women were discharged when MUAC ≥ 230 mm. Lactating women were discharged when BMI ≥ 18	Community volunteers (priority to those able to read and write and those already playing the role of a community health worker). 5-day training course was provided on screening and treatment of SAM and MAM	• Recovery • Case-fatality • Weight gain • Default • Service uptake • Referrals to feeding centre or hospital for management of SAM • Community volunteers' competency in screening, diagnosis and treatment (Baseline and 12 weeks or discharge)
Tandon 1984 (India)	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	Rural, tribal and urban slums from 15 major states in India (Study period not mentioned)	Children aged < 6 years with Grade II malnutrition (WAZ 60% to 70%) or Grade III malnutrition (WAZ ≤ 60%)	Not mentioned	Anganwadi and home feeding	Supplementary food was provided to Grade II malnourished children, therapeutic nutrition (BalAmul containing protein, fat, carbohydrate, Ca, Fe, and vitamins A, D, B_1, B_2 and B_4) or double ration of supplementary nutrition in semisolid or liquid forms to Grade III malnourished children, vitamin A 100,000 IU every 6 months, iron and folate tablets daily.	AWW, a local village woman with 8 years to 10 years of education and provided with 3 months of training	• Prevalence of severe malnutrition • Dropout rate and follow-up rate • Mortality • Referral to primary

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

						Severely malnourished children consumed 2 feeds at the Anganwadi within a 4-hour period, and the third feed was provided to be given at home. An attempt was made to provide 1200 calories to 1500 calories and 20 g to 25 g of protein daily. Programme duration: 12 weeks		health centre medical officer • Attendance at the primary health centre after referral • Weight change (Baseline and 12 weeks)
Teshome 2019 (Southern Ethiopia)	Repeated-measures (pre-post) single-group prospective cohort study (no control or comparison group)	Shebedino District of Sidama zone, Southern Ethiopia, located in the Great Rift Valley area (~300 km South of Addis Ababa). Shebedino is subdivided into 35 kebeles (32 rural and 3 urban), each comprising ~1000 households. In 2015, Shebedino had an estimated population of 294,214 (~14% aged 6 months to 59 months).	All children aged 6 months to 59 months with newly diagnosed uncomplicated SAM identified during an outreach campaign and enrolled in the OTP were eligible for the study. According to the national protocol, uncomplicated SAM cases are diagnosed as children with good appetite and no major medical compli-	Children with medical complications, severe oedema or poor appetite were referred for management as inpatients	OTP for SAM treatment by HEWs working in health posts (All Ethiopian kebeles are expected to have a health post whereby at least 2 HEWs are deployed to provide a package of preventive and essential curative services, including the management of uncomplicated SAM in children.)	HEWs identify SAM cases from their catchment area through multiple modalities, including periodic growth monitoring and promotion, enhanced outreach strategy and community health day campaigns, and static service provided at the health post. Children fulfilling the admission criteria were enrolled and given a weekly Plumpy'Nut ration, a peanut-based RUTF. Each week, their weight was taken until they achieved a target weight stated in the protocol. On each visit, the children were expected to receive a medical assessment, and caregivers should have received nutritional education. Maximum treatment duration was 8 weeks. Children were followed up to recovery, or 8 weeks, whichever was first	Not described	• Recovery • Defaulted • Non-response • Death • Time to recovery (Baseline and 8 weeks or discharge)

Table 3. Narrative table of studies not meeting the criteria for data extraction and meta-analysis *(Continued)*

	The district has 1 primary hospital, 9 health centres and 32 health posts, making the potential health service coverage 98%. (May 2015 to July 2015)	cation and with MUAC < 110 mm or 1st- or 2nd-degree bilateral pitting oedema or both

AWW: Anganwadi worker; BBC: behaviour change communication; BMI: body mass index; CBD: community-based distributor; CORP: community-oriented resource person; DALY: disability-adjusted life year; HAZ: height-for-age Z-score; HEW: health extension worker; IAP: Indian Academy of Paediatrics; iCCM: integrated community case management; LHW: lay health worker; LTF-MN: local therapeutic food with micronutrients; MAM: moderate acute malnutrition; MNT: medical nutrition therapy; MUAC: mid-upper arm circumference; NGO: nongovernmental organisation; OTP: outpatient therapeutic programme; QOC: quality of care; RCT: randomised controlled trial; RUTF: ready-to-use therapeutic food; SAM: severe acute malnutrition; SNEHA: Society for Nutrition, Education and Health Action; VHW: village health worker; WAZ: weight-for-age Z-score; WHO: World Health Organization; WHZ: weight-for-height Z-score.

APPENDICES

Appendix 1. GRADE evidence profile of studies

Author(s): Papadopoulou E, Lim YC, Chin WY, Dwan K, Munabi-Babigumira S, Lewin S

Question: identification or treatment or both by LHWs compared to health professionals for wasting in children

Setting: Malawi (Linneman 2007; Wroe 2021), Mali (Alvarez Moran 2018), Mauritania (Charle-Cuellar 2021), Niger (Ogobara Dougnon 2021), Pakistan (Hussain 2021), Tanzania (Wilunda 2021)

Bibliography: Papadopoulou E, Lim YC, Chin WY, Dwan K, Munabi-Babigumira S, Lewin S. Lay health workers in primary and community health care for maternal and child health: identification and treatment of wasting in children. Cochrane Database of Systematic Reviews [Year], Issue [Issue]

Certainty assessment							Number of participants		Effect		Certainty	Importance
Number of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	LHWs	Health professionals	Relative (95% CI)	Absolute (95% CI)		
Intervention 1: identification of children with wasting by LHWs(in community settings) compared with identification by health professionals												
Intervention 2: identification of children with wasting and medical complications needing referral for inpatient care by LHWs (in community settings) compared with identification by health professionals												
Anthropometric recovery: percentage of children who recovered from moderate to severe wasting defined as percentage of children aged 6 months to 59 months discharged as cured in treatment programmes for moderate or severe malnutrition, where 'cured' is defined by MUAC ≥ 125 mm, WHZ ≥ −2, no bilateral pitting oedema, and clinically well and alert for 2 consecutive visits (Wroe 2021)												
1	Randomised trial	Serious[a]	Not serious	Not serious	Serious[b]	None	29,475 (postintervention)	29,475 (preintervention	—	MD 1% higher[c] (2.53% lower to 4.53% higher)	⊕⊕⊖⊖ Low	Critical
Intervention 3: identification and treatment of children with wasting but no medical complications needing inpatient care by LHWs (in community settings) compared to that by health professionals.												
Anthropometric recovery: improvement from severe wasting defined as MUAC ≥ 115 mm, clinically well, absence of oedema for 2 consecutive visits, and minimum stay of 8 weeks in the programme (Hussain 2021)												
1	Randomised trial	Serious[a]	Not serious	Not serious	Serious[d]	None	323/408 (79.2%)	326/381 (85.6%)	RR 0.93 (0.86 to 0.99)	60 fewer per 1000 children (from 120 fewer to 9 fewer children)	⊕⊕⊖⊖ Low	Critical
Anthropometric recovery defined as: WHZ ≥ 1.5 or MUAC > 125 mm for 2 consecutive visits and absence of nutritional oedema for 14 days (Alvarez Moran 2018); absence of oedema, WHZ ≥ 1.5 or MUAC > 125 mm or both (Charle-Cuellar 2021); no oedema and WHZ > 85% (Linneman 2007); no oedema for 14 days and WHZ ≥ −2 or MUAC ≥ 125 mm or both (Ogobara Dougnon 2021); MUAC ≥ 125 mm (Wilunda 2021)												
5	Observational studies	Serious[e]	Serious[f]	Not serious	Serious[g]	None	3237/3922 (82.5%)	2242/2766 (81.1%)	RR 1.06 (1.00 to 1.11)	49 more per 1000 children (from 0 fewer to 89 more children)	⊕⊖⊖⊖ Very low	Critical
Non-response to treatment defined as not meeting criteria for recovery within 4 months (Hussain 2021)												
1	Randomised trial	Serious[a]	Not serious	Not serious	Serious[h]	None	85/408 (20.8%)	55/381 (14.4%)	RR 1.44 (1.04 to 2.01)	64 more children did not respond per 1000 children	⊕⊕⊖⊖ Low	Critical

(Continued)

										(from 6 more to 146 more children)		
Non-response to treatment defined as not achieving WHZ > 85% of ideal or relapse requiring inpatient treatment (Linneman 2007); persistent oedema at 21 days or no weight gain in 2 consecutive visits (Ogobara Dougnon 2021); failure to attain discharge criteria after 3 months of treatment (Wilunda 2021)												
3	Observational studies	Very serious[i]	Not serious	Not serious	Serious[j]	None	151/2683 (5.6%)	46/1124 (4.1%)	RR 1.29 (0.93 to 1.78)	12 more children did not respond per 1000 children (from 3 fewer to 32 more children)	⊕⊖⊖⊖ Very low	Critical
Sustained recovery												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Important
Anthropometric outcomes: number of children with normal or underweight WHZ on discharge defined as WHZ > −2 (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Very serious[k]	None	236/408 (57.8%)	235/381 (61.7%)	RR 0.94 (0.28 to 3.18)	37 fewer children had WHZ in normal or underweight range per 1000 children (from 444 fewer to 1000 more children)	⊕⊕⊖⊖ Low	Important
Anthropometric outcomes: number of children with WHZ in moderate wasting range on discharge defined as WHZ between −3 and −2 (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Serious[l]	None	128/408 (31.4%)	110/381 (28.9%)	RR 1.09 (0.87 to 1.36)	26 more children had WHZ in moderate wasting range per 1000 children (from 38 fewer to 104 more children)	⊕⊕⊕⊖ Moderate	Important
Anthropometric outcomes: number of children with WHZ in severe wasting range on discharge defined as WHZ below −3 (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Serious[m]	None	37/408 (9.1%)	28/381 (7.3%)	RR 1.23 (0.75 to 2.04)	17 more children had WHZ in severe wasting range per 1000 children (from 18 fewer to 76 more children)	⊕⊕⊕⊖ Moderate	Important
Anthropometric outcomes: number of children with MUAC ≥ 115 mm on discharge (Hussain 2021)												

(Continued)

1	Randomised trial	Not serious	Not serious	Not serious	Seriousⁿ	None	340/408 (83.3%)	321/381 (84.3%)	RR 0.99 (0.93 to 1.06)	8 fewer per 1000 children (from 59 fewer to 51 more children)	⊕⊕⊕⊖ Moderate	Important
Anthropometric outcomes: total MUAC gain defined as MUAC at discharge − MUAC on admission among children with no oedema and discharged as cured (Charle-Cuellar 2021)												
1	Observational study	Seriousᵒ	Not serious	Not serious	Seriousᵖ	None	364	168	—	Median 2 mm higher among children treated by CHWs	⊕⊖⊖⊖ Very low	Important
Anthropometric outcomes: MUAC gain per day defined as (discharge MUAC − admission MUAC)/days in treatment among children with no oedema and discharged as cured (Charle-Cuellar 2021)												
1	Observational study	Seriousᵒ	Not serious	Not serious	Seriousᵠ	None	363	168	—	MD 0.02 mm/day higher among children treated by CHWs	⊕⊖⊖⊖ Very low	Important
Anthropometric outcomes: total weight gain (g/kg) defined as (weight at discharge − weight on admission)/weight on admission among children with no oedema and discharged as cured (Charle-Cuellar 2021)												
1	Observational study	Seriousᵒ	Not serious	Not serious	Seriousʳ	None	356	161	—	Median 12.5 g/kg higher among children treated by CHWs	⊕⊖⊖⊖ Very low	Important
Anthropometric outcomes: weight gain per day (g/kg/day; RCTs) defined as ((discharge weight − admission weight)/weight on admission)/days in treatment among recovered children (Hussain 2021; RCT)												
1	Randomised trial	Not serious	Not serious	Not serious	Not serious	None	284	287	—	MD 0.5 g/kg/day higher among children treated by CHWs (1.74 lower to 2.74 higher)	⊕⊕⊕⊕ High	Important
Anthropometric outcomes: weight gain per day (mean in g/kg/day; non-RCTs) defined as ((discharge weight − admission weight)/admission weight)/days in treatment (Wilunda 2021)												
1	Observational study	Seriousˢ	Not serious	Not serious	Not serious	None	198	145	—	MD 0 g/kg/day (0.89 lower to 0.89 higher)	⊕⊖⊖⊖ Very low	Important

(Continued)

Anthropometric outcomes: weight gain per day (median in g/kg/day; non-RCTs) defined as ((discharge weight − admission weight)/weight on admission]/days on treatment among children with no oedema and discharged as cured (Charle-Cuellar 2021)

1	Observational study	Serious[o]	Not serious	Not serious	Serious[t]	None	356	161	—	Median 0.05 g/kg/d higher among children treated by CHWs	⊕⊖⊖⊖ Very low	Important
Relapse defined as MUAC < 115 mm within 2 months among recovered children (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Serious[n]	none	47/323 (14.6%)	46/326 (14.1%)	RR 1.03 (0.69 to 1.54)	4 more per 1000 children (from 44 fewer to 76 more children)	⊕⊕⊕⊖ Moderate	Critical
Deterioration to severe wasting												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Important
Transfer to inpatient care (RCT) defined as referral for complications such as fever, pneumonia, anorexia, and dehydration (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Serious[u]	none	4/430 (0.9%)	1/399 (0.3%)	RR 3.71 (0.36 to 38.23)	7 more per 1000 children (from 2 fewer to 93 more children)	⊕⊕⊕⊖ Moderate	Important
Transfer to inpatient care (non-RCTs) defined as appearance of severe signs of illness, persistent oedema, absence of weight gain in non-oedematous participants, weight loss (Charle-Cuellar 2021); appearance of severe medical complications or loss of appetite (Ogobara Dougnon 2021); presence of danger signs and failed appetite test on first day of treatment (Alvarez Moran 2018); development of medical complications, oedema, weight loss or appetite loss, or static weight on 3 consecutive visits, or request by caregiver (Wilunda 2021)												
4	Observational studies	Serious[v]	Not serious	Not serious	Not serious	None	160/3381 (4.7%)	54/1358 (4.0%)	RR 1.42 (1.04 to 1.95)	17 more per 1000 children (from 2 more to 38 more children)	⊕⊖⊖⊖ Very low	Important
Mortality among children with severe wasting (RCT; Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Very serious[w]	None	1/430 (0.2%)	2/399 (0.5%)	RR 0.46 (0.04 to 5.98)	3 fewer per 1000 children (from 5 fewer to 25 more children)	⊕⊕⊖⊖ Low	Critical

(Continued)

Mortality among children with wasting (non-RCTs; Alvarez Moran 2018; Charle-Cuellar 2021; Linneman 2007; Ogobara Dougnon 2021; Wilunda 2021)												
5	Observational studies	Serious[x]	Not serious	Not serious	Serious[y]	None	51/3922 (1.3%)	41/2766 (1.5%)	RR 0.89 (0.56 to 1.44)	2 fewer per 1000 children (from 7 fewer to 7 more children)	⊕⊖⊖⊖ Very low	Critical
Appropriate identification of children with wasting												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Important
Appropriate identification of children with oedema												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Important
Appropriate referral of children with moderate or severe wasting												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Important
Treatment coverage defined as proportion of children with SAM being reached with treatment based on the number of children treated from baseline to endline (Wilunda 2021)												
1	Observational study	Serious[s]	Not serious	Not serious	Not serious	None	195/241 (80.9%)	85/204 (41.7%)	RR 1.94 (1.62 to 2.32)	392 more per 1000 children (from 258 more to 550 more children)	⊕⊖⊖⊖ Very low	Important
Caregiver adherence to care plans												
0	—	—	—	—	—			—	Not estimable	—	—	Important
Default from care (RCT) defined as absence on 2 consecutive visits (Hussain 2021)												
1	Randomised trial	Not serious	Not serious	Not serious	Serious[m]	None	16/430 (3.7%)	10/399 (2.5%)	RR 1.48 (0.65 to 3.40)	12 more per 1000 children (from 9 fewer to 60 more children)	⊕⊕⊕⊖ Moderate	Important

(Continued)

Default from care (non-RCTs) defined as absence on 2 follow-up visits (Charle-Cuellar 2021; Linneman 2007); absence on 2 consecutive visits (Ogobara Dougnon 2021; Alvarez Moran 2018); absence on 3 consecutive visits (Wilunda 2021)

5	Observational studies	Serious[x]	Serious[z]	Not serious	Not serious	None	249/3922 (6.3%)	274/2766 (9.9%)	RR 0.57 (0.40 to 0.82)	43 fewer per 1000 children (from 59 fewer to 18 fewer children)	⊕⊖⊖⊖ Very low	Important
Adverse effects and other harms												
0	—	—	—	—	—	—	—	—	Not estimable	—	—	Not important
Transfer to another health facility or LHW site or both (Alvarez Moran 2018; Charle-Cuellar 2021; Ogobara Dougnon 2021)												
3	Observational studies	Serious[aa]	Not serious	Not serious	Not serious	None	98/3171 (3.1%)	22/1210 (1.8%)	RR 1.67 (1.04 to 2.68)	12 more per 1000 children (from 1 more to 31 more children)	⊕⊖⊖⊖ Very low	Not important

CHW: community health worker; CI: confidence interval; LHW: lay health worker; MD: mean difference; MUAC: mid-upper arm circumference; RCT: randomised controlled trial; RR: risk ratio; SAM: severe acute malnutrition; WHZ: weight-for-height Z-score.

[a] Recovery criteria included subjective criterion of child being "clinically well", and there was no blinding of outcome assessors.
[b] 95% CI crosses the null value, and effect ranges from trivial harm to small benefit.
[c] Recovery rate 96.8% in intervention group versus 95.9% in comparison group.
[d] 95% CI does not cross the null value, but effect ranges from moderate to trivial harm.
[e] All five studies had high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics. Alvarez Moran 2018, Linneman 2007 and Ogobara Dougnon 2021 had high risk of bias due to unequal baseline outcomes. Charle-Cuellar 2021 had high risk of bias due to attrition. All five studies had high overall risk of bias.
[f] I^2 = 74%.
[g] 95% CI crosses the null value, and the effect ranges from trivial harm to small benefit.
[h] 95% CI does not cross the null, but the effect ranges from trivial to moderate harm.
[i] All three studies had high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics. Ogobara Dougnon 2021 had high risk of bias due to unequal baseline outcomes. Charle-Cuellar 2021 had high risk of bias due to attrition. All three studies had high overall risk of bias.
[j] 95% CI crosses the null value, and effect ranges from trivial benefit to moderate harm.
[k] 95% CI crosses the null value, and the effect ranges from substantial harm to very large benefit.
[l] 95% CI crosses the null value, and the effect ranges from trivial benefit to moderate harm.
[m] 95% CI crosses the null value, and the effect ranges from trivial benefit to small harm.
[n] 95% CI crosses the null value, and the effect ranges from small benefit to small harm.
[o] Charle-Cuellar 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment, unequal baseline characteristics and attrition.
[p] The interquartile ranges of the two groups overlap (9.0 to 16.0 for intervention; 8.0 to 15.0 for control).
[q] The interquartile ranges of the two groups overlap (0.20 to 0.43 for intervention; 0.17 to 0.41 for control).
[r] The interquartile ranges of the two groups overlap (164.6 to 255.2 for intervention; 157.9 to 254.3 for control).
[s] Wilunda 2021 was at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics.
[t] The interquartile ranges of the two groups overlap (3.39 to 7.35 for intervention; 3.17 to 7.11 for control).
[u] 95% CI crosses the null value, and the effect ranges from trivial benefit to moderate harm.
[v] All four studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics. Charle-Cuellar 2021 was at high risk of bias due to attrition in outcome assessment. All four studies were at high overall risk of bias.
[w] 95% CI crosses the null value, and the effect ranges include important appreciable differences from the point estimate for mortality.
[x] All five studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics. Charle-Cuellar 2021 were at high risk of bias due to attrition. All five studies were at high overall risk of bias.
[y] 95% CI crosses the null value, and the effect ranges include appreciable differences from the point estimate for mortality.
[z] I^2 = 63%.
[aa]All three studies were at high risk of bias due to non-randomisation, lack of allocation concealment and unequal baseline characteristics. Charle-Cuellar 2021 was at high risk of bias due to attrition. Ogobara Dougnon 2021 was at high risk of bias due to possible selective reporting (outcome was not defined). All three studies were at high overall risk of bias.

Appendix 2. Search strategies

Epistemonikos, Epistemonikos Foundation (searched 24 September 2021)
Title/abstract: "community health worker" OR "community health workers" OR "lay worker" OR "lay workers" OR "lay health worker" OR "lay health workers" OR "lay healthcare worker" OR "lay healthcare workers" OR "lay health care worker" OR "lay health care workers" OR "traditional birth attendant" OR "traditional birth attendants" OR doula OR doulas OR "village health worker" OR "village health workers" OR "village healthcare worker" OR "village healthcare workers" OR "village health care worker" OR "village health care workers"
AND
Title/abstract: undernutrition OR "under nutrition" OR under-nutrition OR undernourished OR "under nourished" OR under-nourished OR underfed OR undernourishment OR under-nourishment OR malnutrition OR "mal nutrition" OR mal-nutrition OR malnourished OR "mal nourished" OR mal-nourished OR malnourishement OR mal-nourishment OR "deficiency disease" OR "deficiency diseases" OR "nutrition deficiency" OR "nutritional deficiency" OR "nutrition disease" OR "nutrition diseases" OR "nutritional disease" OR "nutritional diseases" OR "nutrition disorder" OR "nutrition disorders" OR "nutritional disorder" OR "nutritional disorders" OR

(Continued)

"nutrient deficiency" OR "nutrient disease" OR "nutrient diseases" OR marasmus OR kwashiorkor OR emaciat* OR wasted OR wasting OR stunted OR stunting OR "failure to thrive" OR "growth disorder" OR "growth disorders" OR "growth failure" OR "growth faltering" OR starvation OR starving OR underweight OR "under weight" OR under-weight OR thinness OR leanness OR "arm circumference" OR arm-circumference OR "weight for age" OR weight-for-age OR "weight for height" OR weight-for-height OR anthropometr*

Limited to publication type: Broad synthesis, Structured summary, Systematic review

MEDLINE ALL 1946 to 23 September 2021, Ovid (searched 24 September 2021)

No.	Search terms	Results
1	Community Health Workers/	5859
2	Doulas/	167
3	((lay adj worker?) or (lay adj health* worker?) or (lay adj health care worker?)).ti,ab,kf.	571
4	(lay adj3 (counselor? or counsellor? or counseling or counselling or coach* or intervention? or support or outreach or delivered or staff or led or provider? or based or volunteer? or mentor* or educator? or visitor? or adviser? or advisor? or facilitator? or person*)).ti,ab,kf.	2606
5	(community worker? or community health* worker? or community health care worker? or community volunteer?).ti,ab,kf.	6789
6	(community based worker? or community based health* worker? or community based health care worker? or community based volunteer?).ti,ab,kf.	247
7	(village worker? or village health* worker? or village health care worker?).ti,ab,kf.	414
8	(village based worker? or village based health* worker? or village based health care worker?).ti,ab,kf.	20
9	((peer adj worker?) or (peer adj health* worker?) or (peer adj health care worker?)).ti,ab,kf.	194
10	(peer adj (counselor? or counsellor? or counseling or counselling or coach* or intervention? or support or outreach or delivered or staff or led or provider? or based or volunteer? or mentor* or educator? or visitor? or adviser? or advisor? or facilitator? or personnel)).ti,ab,kf.	9476
11	((non professional? or nonprofessional? or paraprofessional?) adj3 (counselor? or counsellor? or counseling or counselling or coach* or intervention? or support or outreach or delivered or staff or led or provider? or based or volunteer? or mentor* or educator? or visitor? or adviser? or advisor? or facilitator? or personnel)).ti,ab,kf.	652
12	(volunteer? adj3 (counselor? or counsellor? or counseling or counselling or coach* or intervention? or support or outreach or delivered or staff or led or provider? or based or mentor* or educator? or visitor? or adviser? or advisor?)).ti,ab,kf.	3241

(Continued)

13	((outreach or support or family) adj worker*).ti,ab,kf.	1649
14	(birth attendan* or doula or doulas).ti,ab,kf.	3281
15	((parent* or mother?) adj3 (mentor* or facilitator?)).ti,ab,kf.	362
16	(trained adj3 (mother? or case manager? or leader?)).ti,ab,kf.	460
17	((support adj (intervention? or program*)) and (community based or telephone or phone or volunteer? or women* or mother? or maternal or pregnancy or parent? or child or children or infant?)).ti,ab,kf.	2766
18	((home visit* or household visit*) adj3 (intervention? or program* or condition or non professional? or nonprofessional? or paraprofessional? or volunteer?)).ti,ab,kf.	1650
19	(home treatment and mother?).ti,ab,kf.	70
20	(home based adj3 intervention?).ti,ab,kf.	1400
21	(social network? adj3 intervention?).ti,ab,kf.	307
22	(participatory adj3 women's group?).ti,ab,kf.	54
23	task shift*.ti,ab,kf.	1306
24	or/1-23	36975
25	Wasting Syndrome/	1379
26	Nutrition Disorders/	18245
27	Child Nutrition Disorders/	3701
28	Infant Nutrition Disorders/	4662
29	Malnutrition/	15673
30	Severe Acute Malnutrition/	323
31	Kwashiorkor/	2616
32	Protein-Energy Malnutrition/	7360
33	Emaciation/	683
34	Deficiency Diseases/	7933
35	Growth Disorders/	17690
36	Failure to Thrive/	2310
37	Starvation/	10027
38	Thinness/	6732

(Continued)

39	Anthropometry/	40163
40	Body Weights and Measures/	6750
41	(undernutrition or under nutrition or undernourish* or under nourish* or underfed or malnutrition or mal nutrition or malnourish* or mal nourish* or deficiency disease* or nutrition* defic* or nutrition* disease* or nutrition* disorder* or nutrient defic* or nutrient disease* or nutrient disorder* or marasmus or kwashiorkor or emaciat* or wasted or wasting or stunted or stunting or failure to thrive or growth disorder* or growth failure or growth faltering or starvation or starving or underweight or under weight or thinness or leanness or (arm adj2 measur*) or (arm adj2 circumference) or (weight adj2 age) or (weight adj2 height) or anthropometr*).ti,ab,kf.	259961
42	or/25-41	325165
43	24 and 42	1009

	Cochrane Central Register of Controlled Trials Issue 9 of 12, September 2021, part of Cochrane Library, Wiley (searched 24 September 2021)	
ID	Search	Hits
#1	MeSH descriptor: [Community Health Workers] this term only	525
#2	MeSH descriptor: [Doulas] this term only	9
#3	(lay near/3 worker*):ti,ab,kw	274
#4	(lay near/3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or person*)):ti,ab,kw	774
#5	(community near/3 worker*):ti,ab,kw	1991
#6	(community next volunteer*):ti,ab,kw	168
#7	("community based" near/3 worker*):ti,ab,kw	75
#8	("community based" next volunteer*):ti,ab,kw	14
#9	(village near/3 worker*):ti,ab,kw	120
#10	("village based" near/3 worker*):ti,ab,kw	9
#11	(peer near/3 worker*):ti,ab,kw	111
#12	(peer next (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel)):ti,ab,kw	2854

(Continued)

#13	(("non professional" or "non professionals" or nonprofessional or nonprofessionals or paraprofessional or paraprofessionals) near/3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel)):ti,ab,kw	192
#14	(volunteer* near/3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or mentor* or educator* or visitor* or adviser* or advisor*)):ti,ab,kw	1644
#15	((outreach or support or family) next worker*):ti,ab,kw	251
#16	(birth next attendan* or doula or doulas):ti,ab,kw	360
#17	((parent* or mother*) near/3 (mentor* or facilitator*)):ti,ab,kw	148
#18	(trained near/3 (mother* or case next manager* or leader*)):ti,ab,kw	248
#19	(support next intervention* or support next program*):ti,ab,kw and ("community based" or telephone or phone or volunteer* or women* or mother* or maternal or pregnancy or parent* or child or children or infant*):ti,ab,kw	1259
#20	((home next visit* or household next visit*) near/3 (intervention* or program* or condition or non next professional* or nonprofessional* or paraprofessional* or volunteer*)):ti,ab,kw	953
#21	home treatment:ti,ab,kw and mother*:ti,ab,kw	11
#22	("home based" near/3 intervention*):ti,ab,kw	1440
#23	((social next network*) near/3 intervention*):ti,ab,kw	211
#24	(participatory near/3 (women* next group*)):ti,ab,kw	35
#25	(task next shift*):ti,ab,kw	220
#26	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25	11606
#27	MeSH descriptor: [Wasting Syndrome] this term only	158
#28	MeSH descriptor: [Nutrition Disorders] this term only	495
#29	MeSH descriptor: [Child Nutrition Disorders] this term only	243
#30	MeSH descriptor: [Infant Nutrition Disorders] this term only	142
#31	MeSH descriptor: [Malnutrition] this term only	1179
#32	MeSH descriptor: [Severe Acute Malnutrition] this term only	91
#33	MeSH descriptor: [Kwashiorkor] this term only	52
#34	MeSH descriptor: [Protein-Energy Malnutrition] this term only	252

(Continued)

#35	MeSH descriptor: [Emaciation] this term only	5
#36	MeSH descriptor: [Deficiency Diseases] this term only	218
#37	MeSH descriptor: [Growth Disorders] this term only	678
#38	MeSH descriptor: [Failure to Thrive] this term only	61
#39	MeSH descriptor: [Starvation] this term only	49
#40	MeSH descriptor: [Thinness] this term only	298
#41	MeSH descriptor: [Anthropometry] this term only	2151
#42	MeSH descriptor: [Body Weights and Measures] this term only	258
#43	(undernutrition or "under nutrition" or undernourished or "under nourished" or underfed or undernourishment or "under nourishment" or malnutrition or "mal nutrition" or malnourished or "mal nourished" or malnourishement or "mal nourishment" or "deficiency disease" or "deficiency diseases" or "nutrition deficiency" or "nutritional deficiency" or "nutrition disease" or "nutrition diseases" or "nutritional disease" or "nutritional diseases" or "nutrition disorder" or "nutrition disorders" or "nutritional disorder" or "nutritional disorders" or "nutrient deficiency" or "nutrient disease" or "nutrient diseases" or marasmus or kwashiorkor or emaciat* or wasted or wasting or stunted or stunting or "failure to thrive" or "growth disorder" or "growth disorders" or "growth failure" or "growth faltering" or starvation or starving or underweight or "under weight" or thinness or leanness or (arm near/2 measur*) or (arm near/2 circumference) or (weight near/2 age) or (weight near/2 height) or anthropometr*):ti,ab,kw	35037
#44	#27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42 or #43	35224
#45	#26 and #44	594
#46	#45 in Trials	584

CINAHL, EBSCO (Cumulative Index to Nursing and Allied Health Literature); 1980 to present (searched 24 September 2021)

#	Query	Results
S1	(MH "Community Health Workers") or (MH "Doulas")	4,602
S2	TI (("lay worker" or "lay workers" or "lay health worker" or "lay health workers" or "lay healthcare worker" or "lay healthcare workers" or "lay health care worker" or "lay health care workers")) OR AB (("lay worker" or "lay workers" or "lay health worker" or "lay health workers" or "lay healthcare worker" or "lay healthcare workers" or "lay health care worker" or "lay health care workers"))	297
S3	TI (lay N3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or	1,576

(Continued)

	based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or person*)) OR AB (lay N3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or person*))	
S4	TI (("community worker" or "community workers" or "community health worker" or "community health workers" or "community healthcare worker" or "community healthcare workers" or "community health care worker" or "community health care workers" or "community volunteer" or "community volunteers")) OR AB (("community worker" or "community workers" or "community health worker" or "community health workers" or "community healthcare worker" or "community healthcare workers" or "community health care worker" or "community health care workers" or "community volunteer" or "community volunteers"))	3,464
S5	TI (("community based worker" or "community based workers" or "community based health worker" or "community based health workers" or "community based healthcare worker" or "community based healthcare workers" or "community based health care worker" or "community based health care workers" or "community based volunteer" or "community based volunteers")) OR AB (("community based worker" or "community based workers" or "community based health worker" or "community based health workers" or "community based healthcare worker" or "community based healthcare workers" or "community based health care worker" or "community based health care workers" or "community based volunteer" or "community based volunteers"))	137
S6	TI (("village worker" or "village workers" or "village health worker" or "village health workers" or "village healthcare worker" or "village healthcare workers" or "village health care worker" or "village health care workers")) OR AB (("village worker" or "village workers" or "village health worker" or "village health workers" or "village healthcare worker" or "village healthcare workers" or "village health care worker" or "village health care workers"))	109
S7	TI (("village based worker" or "village based workers" or "village based health worker" or "village based health workers" or "village based healthcare worker" or "village based healthcare workers" or "village based health care worker" or "village based health care workers")) OR AB (("village based worker" or "village based workers" or "village based health worker" or "village based health workers" or "village based healthcare worker" or "village based healthcare workers" or "village based health care worker" or "village based health care workers"))	5
S8	TI (("peer worker" or "peer workers" or "peer health worker" or "peer health workers" or "peer healthcare worker" or "peer healthcare workers" or "peer health care worker" or "peer health care workers")) OR AB (("peer worker" or "peer workers" or "peer health worker" or "peer health workers" or "peer healthcare worker" or "peer healthcare workers" or "peer health care worker" or "peer health care workers")	124
S9	TI (peer W0 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel)) OR AB (peer W0 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel))	7,431
S10	TI (("non professional" or "non professionals" or nonprofessional or nonprofessionals or paraprofessional or paraprofessionals) N3 (counselor* or coun-	426

(Continued)

	sellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel)) OR AB (("non professional" or "non professionals" or nonprofessional or nonprofessionals or paraprofessional or paraprofessionals) N3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or volunteer* or mentor* or educator* or visitor* or adviser* or advisor* or facilitator* or personnel))	
S11	TI (volunteer* N3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or mentor* or educator* or visitor* or adviser* or advisor* or facilitator*)) OR AB (volunteer* N3 (counselor* or counsellor* or counseling or counselling or coach* or intervention* or support or outreach or delivered or staff or led or provider* or based or mentor* or educator* or visitor* or adviser* or advisor* or facilitator*))	2,756
S12	TI ((outreach or support or family) W0 worker*) OR AB ((outreach or support or family) W0 worker*)	2,001
S13	TI (birth W0 attendan*) or doula or doulas OR AB birth W0 attendan* doula or doulas	1,494
S14	TI ((parent* or mother*) N3 (mentor* or facilitator*)) AND AB ((parent* or mother*) N3 (mentor* or facilitator*))	56
S15	TI (trained W3 (mother* or case W0 manager* or leader*)) OR AB (trained W3 (mother* or case W0 manager* or leader*))	182
S16	TI ((support W0 intervention* or support W0 program*) and ("community based" or telephone or phone or volunteer* or women* or mother* or maternal or pregnancy or parent* or child or children or infant*)) OR AB ((support W0 intervention* or support W0 program*) and ("community based" or telephone or phone or volunteer* or women* or mother* or maternal or pregnancy or parent* or child or children or infant*))	2,061
S17	TI ((home W0 visit* or household W0 visit*) N3 (intervention* or program* or condition or non W0 professional* or nonprofessional* or paraprofessional* or volunteer*)) OR AB ((home W0 visit* or household W0 visit*) N3 (intervention* or program* or condition or non W0 professional* or nonprofessional* or paraprofessional* or volunteer*))	1,432
S18	TI ("home treatment" and mother*) OR AB ("home treatment" and mother*)	24
S19	TI "home based" N3 intervention* OR AB "home based" N3 intervention*	1,051
S20	TI (social W0 network*) N3 intervention* OR AB (social W0 network*) N3 intervention*	280
S21	TI participatory N3 (women* W0 group*) OR AB participatory N3 (women* W0 group*)	32
S22	TI task W0 shift* OR AB task W0 shift*	591
S23	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22	25,43

(Continued)

S24	(MH "Wasting Syndrome")	416
S25	(MH "Nutrition Disorders")	5,105
S26	(MH "Child Nutrition Disorders")	1,503
S27	(MH "Infant Nutrition Disorders")	425
S28	(MH "Malnutrition")	10,015
S29	(MH "Kwashiorkor")	140
S30	(MH "Protein-Energy Malnutrition")	941
S31	(MH "Deficiency Diseases")	1,654
S32	(MH "Growth Disorders")	3,26
S33	(MH "Failure to Thrive")	909
S34	(MH "Starvation")	781
S35	(MH "Thinness")	3,366
S36	(MH "Anthropometry")	11,779
S37	(MH "Arm Circumference")	500
S38	(MH "Body Weights and Measures")	38,139
S39	TI ((undernutrition or "under nutrition" or undernourish* or under W0 nourish* or underfed or malnutrition or "mal nutrition" or malnourish* or mal W0 nourish* or deficiency W0 disease* or nutrition* W0 defic* or nutrition* W0 disease* or nutrition* W0 disorder* or nutrient W0 defic* or nutrient W0 disease* or nutrient W0 disorder* or marasmus or kwashiorkor or emaciat* or wasted or wasting or stunted or stunting or "failure to thrive" or growth W0 disorder* or "growth failure" or "growth faltering" or starvation or starving or underweight or "under weight" or thinness or leanness or arm N2 measur* or arm N2 circumference or weight N2 age or weight N2 height or anthropometr*)) OR AB ((undernutrition or "under nutrition" or undernourish* or under W0 nourish* or underfed or malnutrition or "mal nutrition" or malnourish* or mal W0 nourish* or deficiency W0 disease* or nutrition* W0 defic* or nutrition* W0 disease* or nutrition* W0 disorder* or nutrient W0 defic* or nutrient W0 disease* or nutrient W0 disorder* or marasmus or kwashiorkor or emaciat* or wasted or wasting or stunted or stunting or "failure to thrive" or growth W0 disorder* or "growth failure" or "growth faltering" or starvation or starving or underweight or "under weight" or thinness or leanness or arm N2 measur* or arm N2 circumference or weight N2 age or weight N2 height or anthropometr*))	67,826
S40	S24 or S25 or S26 or S27 or S28 or S29 or S30 or S31 or S32 or S33 or S34 or S35 or S36 or S37 or S38 or S39	116,719
S41	S23 AND S40	534
S42	S41 [Limiters - Exclude MEDLINE records]	206

Global Index Medicus, WHO (searched 24 September 2021)

"community health worker" OR "community health workers" OR "lay worker" OR "lay workers" OR "lay health worker" OR "lay health workers" OR "lay healthcare worker" OR "lay healthcare workers" OR "lay health care worker" OR "lay health care workers" OR "traditional birth attendant" OR "traditional birth attendants" OR doula OR doulas OR "village health worker" OR "village health workers" OR "village healthcare worker" OR "village healthcare workers" OR "village health care worker" OR "village health care workers" (in Title, abstract, subject)

AND

undernutrition OR "under nutrition" OR under-nutrition OR undernourished OR "under nourished" OR under-nourished OR underfed OR undernourishment OR under-nourishment OR malnutrition OR "mal nutrition" OR mal-nutrition OR malnourished OR "mal nourished" OR mal-nourished OR malnourishement OR mal-nourishment OR "deficiency disease" OR "deficiency diseases" OR "nutrition deficiency" OR "nutritional deficiency" OR "nutrition disease" OR "nutrition diseases" OR "nutritional disease" OR "nutritional diseases" OR "nutrition disorder" OR "nutrition disorders" OR "nutritional disorder" OR "nutritional disorders" OR "nutrient deficiency" OR "nutrient disease" OR "nutrient diseases" OR marasmus OR kwashiorkor OR emaciat* OR wasted OR wasting OR stunted OR stunting OR "failure to thrive" OR "growth disorder" OR "growth disorders" OR "growth failure" OR "growth faltering" OR starvation OR starving OR underweight OR "under weight" OR under-weight OR thinness OR leanness OR "arm circumference" OR arm-circumference OR "weight for age" OR weight-for-age OR "weight for height" OR weight-for-height OR anthropometr* (in Title, abstract, subject)

WHO International Clinical Trials Registry Platform (ICTRP) (searched 24 September 2021)

Basic search

(wasting OR stunting OR underweight OR under weight OR under-weight OR undernourished OR under nourished OR under-nourished OR undernutrition OR under nutrition OR under-nutrition OR malnourished OR mal nourished OR mal-nourished OR malnutrition OR mal nutrition OR mal-nutrition OR underfed OR marasmus OR kwashiorkor OR emaciation OR arm circumference OR arm-circumference OR weight for age OR weight-for-age OR weight for height OR weight-for-height OR growth disorder OR growth disorders) AND (community health worker OR community health workers OR lay health worker OR lay health workers OR traditional birth attendant OR traditional birth attendants OR doula OR doulas OR village health worker OR village health workers)

ClinicalTrials.gov, NIH (searched 24 September 2021)

Advanced search - Two individual strategies

1.

"community health worker" OR "lay worker" OR "lay health worker" OR "lay healthcare worker" OR "lay health care worker" OR "village health worker" OR "village healthcare worker" OR "village health care worker" (in Intervention)

AND

wasting OR stunting OR underweight OR undernourished OR undernutrition OR malnourished OR malnutrition OR underfed OR marasmus OR kwashiorkor OR emaciation OR "arm circumference" OR "weight for age" OR "weight for height" OR "growth disorder" (in Other terms)

2.

(Continued)

"traditional birth attendant" OR doula (in Intervention)
AND
wasting OR stunting OR underweight OR undernourished OR undernutrition OR malnourished OR malnutrition OR underfed OR marasmus OR kwashiorkor OR emaciation OR "arm circumference" OR "weight for age" OR "weight for height" OR "growth disorder" (in Other terms)

Appendix 3. Table of intervention characteristics of studies in quantitative synthesis (TIDiER format)

Table of intervention characteristics of studies in quantitative synthesis

Study ID	Intervention name	Rationale	Materials	Procedures	Interventionists	Mode of delivery	Location	Frequency and duration	Tailoring and modifications	Adherence and fidelity
Alvarez Moran 2018	iCCM Plus	Determine if the integration of SAM treatment as part of the iCCM package, delivered by LHWs, would provide earlier identification of SAM cases, better access to treatment and improved clinical outcomes	National protocols for iCCM and CMAM; MUAC tapes, height boards, weighing scales, capsules for water treatment	Children received RUTF, amoxicillin, albendazole, vitamin A, monitoring, referral of children with complicated SAM for inpatient care, active community screening every 3 months and passive screening throughout.	Health professionals in 3 health facilities, or 17 LHWs. 79.0% of children were treated by LHWs at the time of admission. Most LHWs had at least secondary school education. Most were midwives. Trained for 2 weeks on iCCM and CMAM and received refresher training 6 months into the study. Supervised twice per month by Action Against Hunger staff and every 3 months by National Institute for Research in Public Health. LHWs were salaried workers.	Face to face, individual household	Mali or Kita District or outpatient	Followed up weekly until discharge	None	Quality of care by 17 LHWs determined by 5 teams of 2 observers. 100% of children were correctly classified for SAM and correctly treated with RUTF. 79.5% of cases were correctly managed with no errors. The investigators measured gaps in checking of vaccine status (28.5%), correct assessment for vitamin A needs (33.3%), correct classification for

(Continued)

										malaria (75%), correct treatment with medical products (75%), correct treatment for pneumonia (66.6%), correct counselling of caretakers on administration of all treatments and dosages (83.3%).
Charle-Cuellar 2021	Integration of SAM treatment into iCCM package	Compare the effectiveness and coverage of SAM treatment delivered by LHWs to the health facility–based approach	Basic health assistance package of iCCM in training module of the Ministry of Health	Children received RUTF (170 kcal/kg/day) to be used at home, amoxicillin 50 mg/kg/day to 100 mg/kg/day × 5 days, 500 mg mebendazole once, monitoring, referred when showing severe signs of illness, persistent oedema, absence of weight gain after 21 days (non-oedema-	Health professionals in 10 health facilities, or 12 LHWs. 20.7% of children were treated by LHWs at the time of admission. All were trained for 21 days on basic health assistance package of iCCM including health promotion, IYCF practices, and treatment of acute malnutrition. LHWs received periodic supportive supervision by healthcare staff from health facility and Action Against Hunger supervisors. Remuneration not reported.	Face to face, individual household	Mauritania/rural/community	Followed up weekly until MUAC > 125 mm or WHZ > 1.5 or both	None	Not assessed

(Continued)

				tous children), weight loss.						
Hussain 2021	CMAM	Compare the performance indicators of CMAM delivered by lady health workers to the standard programme	National CMAM Guidelines; standard wooden scales and electronic weighing machines	Children were managed at home with weekly rations of RUTF, antibiotics and folic acid. Children with complicated SAM were identified and referred to inpatient care. Mothers/caretakers were counselled on IYCF practices.	72 lady health workers. Minimum 8th grade formal education, 2 years training on family planning and basic child health. Trained for 3 days on CMAM protocols, 4 days on SAM case management and IYCF and 2 days on supply management and a refresher 3 to 6 months after initial training. Supervised by lady health worker supervisors monthly and by Action Against Hunger nurses two times per week. Received usual lady health worker allowance.	Face to face, individual household	Pakistan/rural/health houses	Followed up weekly until MUAC > 125 mm	None	Not assessed
Linneman 2007	Home-based RUTF	Evaluate the effectiveness of home-based therapy with RUTF	None specified	Children received RUTF (175 kcal/kg/day with protein 5.3 g/kg/day) and micronutrients in accordance with WHO recommendations, monitoring	Community health aides from 2 rural centres and 1 mission hospital. Trained for 1 month, including working with nurse trainers for 2 days. Supervised through monthly problem-solving and retraining visits by nurse trainers monthly. Remuneration not reported.	Face to face, individual household	Malawi/mostly rural/home-based treatment administered at a rural health centre or mission hospital	Followed up every 2 weeks for 8 weeks, or until WHZ > 0, or until relapse requiring inpatient admission or death	None	Not assessed
Ogobara Dougnon 2021	Integration of SAM treatment in primary health care	Evaluate the effectiveness and coverage of integrating SAM management by	National protocols of management of SAM by the Min-	Children received RUTF (170 kcal/kg/day) to be used at home, monitoring	Nurses in 6 health facilities, or 10 LHWs. 39.2% of children were treated by LHWs. LHWs were trained for 4 days in management of SAM. All LHWs had formal health	Face to face, individual household	Niger/rural/health huts or health facilities	Followed up weekly until MUAC > 125 mm or WHZ > 1.5 or both	During the study period, there was a nurses' strike in	Not assessed

(Continued)

		nonmedical LHWs	istry of Health		education. LHWs were employed by the prefecture or through local contracts.				the health facilities.	
Wilunda 2021	Integrated promotion of nutrition, growth and development	Evaluate the effectiveness, cost-effectiveness and impact on coverage of treatment of SAM by LHWs	None specified	Children received RUTF with dosage based on body weight, monitoring, screening	13 LHWs. Trained to screen and manage children with SAM in the community. Supervised by programme staff and health facility staff. LHWs received incentives.	Face to face, individual household	Tanzania/rural/community and in participants' homes	Weekly follow-up until 1 of the study outcomes was reached	None	Not assessed
Wroe 2021	Household Model	Determine if the Household Model improves retention in care, and increases uptake of women's health services and treatment for paediatric malnutrition, while sustaining the high retention rates for clients in the HIV programme	Checklist to identify children who miss visits or require additional support, referral forms, MUAC tape	LHWs visited households each month, and performed education and screening for STDs, TB, HIV and paediatric malnutrition, enrolment of pregnant women into antenatal care, and referral or accompaniment to clinic.	935 LHWs living in the village they served. Selected based on their ability to read and write. Trained for 5 days on foundational topics; senior LHWs trained for 2 additional days on mentorship and supervision. LHWs were supervised by senior LHWs monthly, and senior LHWs were supervised by facility-based site supervisors. LHWs received a monthly stipend.	Face to face, individual household	Malawi/rural/household	Monthly household visits throughout the study	None	Not assessed

CMAM: community management of acute malnutrition; iCCM: integrated community case management; IYCF: infant and young child feeding; LHW: lay health worker; MUAC: mid-upper arm circumference; RUTF: ready-to-use therapeutic food; SAM: severe acute malnutrition; STD: sexually transmitted disease; TB: tuberculosis; WHO: World Health Organization; WHZ: weight-for-height Z-score.

CONTRIBUTIONS OF AUTHORS

Conceiving the review: SL
Designing the review: EP
Co-ordinating the review: EP
Designing search strategies: EP
Writing the review: EP, WYC, YL
Providing general advice on the review: SL, SMB
Securing funding for the review: SL
Performing previous work that was the foundation of the current study: SL, SM

DECLARATIONS OF INTEREST

EL: none
YL: none
WYC: none
KD: none
SMB: SMB is an editor for Cochrane EPOC but was not involved in the editorial process for this review.
SL: SL is Joint Co-ordinating Editor for Cochrane EPOC but was not involved in the editorial process for this review. SL receives additional funding from the South African Medical Research Council.
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SOURCES OF SUPPORT

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- Cochrane Response, UK

  Help in searching for eligible studies from the ongoing update of the LHW review
- Cochrane EPOC Chile and Epistemonikos Foundation, Chile

  Extraction of included studies from systematic reviews using the Epistemonikos Database

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

There were no changes from the protocol regarding the eligibility criteria and the definitions of types of participants and outcomes. We collected information for the outcome 'transfer to inpatient care' as a proxy for the prespecified outcome 'rate of deterioration'. We also collected information for two additional outcomes that were not predefined in the protocol, namely 'default rate' and 'transfer to another lay health worker site or health facility'. Several included studies reported these outcomes and we considered that they provided important information for the progress of the treatment.

This review is an update of a component of an earlier published Cochrane Review (Lewin 2010). The review methods draw on a generic protocol for updating the earlier Cochrane lay health worker review (Pantoja 2022).

We could not implement the following aspects of the protocol due to insufficient data or lack of studies.

- Subgroup analyses by age groups: birth to 6 months, six to 23 months, and 24 to 59 months.
- Subgroup analyses by sample size category (small and large).
- Subgroup analyses by study setting.
- No studies examined sustained recovery, deterioration to severe wasting, appropriate identification of children with wasting, adherence, or adverse effects and other harms.
- No studies assessed intervention 3 (identification and treatment by LHWs (in community settings) of children with wasting but no medical complications needing referral, following the same criteria for identification of wasting, the same criteria for programme admission and discharge and the same treatment protocols as in the comparison group).
- No studies assessed comparison 2 (identification and treatment of wasting by health facility-based teams, including health professionals and LHWs, following the same criteria for identification of wasting, the same criteria for programme admission and discharge and the same treatment protocols as in the treatment group).

NOTES

This review is based on standard text and guidance provided by Cochrane Effective Practice and Organisation of Care (EPOC).

INDEX TERMS

Medical Subject Headings (MeSH)

*Cachexia; *Child Health; Community Health Services; Family; Health Personnel

MeSH check words

Child; Humans