Nutrition: Home-delivered and Congregate Meal Services for Older Adults

Summary Evidence Table

This table outlines information from the studies included in this review. It details study quality, population and intervention characteristics, and study outcomes considered in this review. Complete references for each study can be found in the Included Studies section of the review summary.

Abbreviations Used in This Document:

- Study design:
  - RCT: randomized controlled trial
- Measurement terms:
  - BP: blood pressure
  - d:day
  - f/u: follow-up
  - g: gram
  - kcal: kilocalorie
  - kg: kilograms
  - mos: months
  - pct pts: percentage points
  - wk: week
  - yrs: years
- Other terms:
  - HDMS: home-delivered meal service
  - MOW: Meals on Wheels
  - NA: not applicable
  - NR: not reported
  - NS: not significant
  - OAA: Older Americans Act
  - PIR: poverty income ratio
  - SES: socioeconomic status

Notes:

- **Suitability of design** includes three categories: greatest, moderate, or least suitable design. Read more
- **Quality of Execution** – Studies are assessed to have good, fair, or limited quality of execution. Read more
- **Race/ethnicity** of the study population: The Community Guide only summarizes race/ethnicity for studies conducted in the United States.

Study	Study Sample	Intervention Characteristics	Results
Author, Year: An et al., 2015 **Study Design:** Retrospective self-controlled **Suitability of Design**: Moderate **Quality of Execution**: Fair **Limitations: 3** Description, exposure, other (content of meals not described) **Study Arm(s):** Single	**Sample size:** Intervention: 145 **Demographics:** Mean age: 67.9 yrs Gender: 57.0% female Race/ethnicity: 11.3% Black or African American, 13.8% Hispanic, 4.8% other, 70.0% White SES: 43.6% PIR <130%, 37.3 130%≤PIR<300%, 19.2 PIR≥ 300% Living Situation: 41.7% live with others	**Location (urbanicity):** national sample in U.S. (NR) **Intervention duration, if applicable:** NR **When intervention occurred:** 2003-2012 **Intervention:** HDMS: existing participants Frequency: unknown Content of meals: unknown Funding: unknown Meals delivered by local providers	**Analysis:** Compared on a day participants received a meal to a day they did not receive a meal **Energy intake (kcal/d)** Day with meal: 1830.0 Day without meal: 1678.3 Regression coefficient:133.9 (p= NS) **Protein intake (g/d)** Day with meal: 69.6 Day without meal: 68.5 Regression coefficient: 8.4 (p=0.05<p<0.10) **Vitamin and mineral intake** Favorable: Vitamin D, Calcium, Magnesium, Potassium Unfavorable: Sodium **Paper conclusions**: HDMS recipients improved nutritional intake
Author, Year: Denissen et al., 2017 **Study Design:** Other design with concurrent comparison **Suitability of Design**: Greatest **Quality of Execution**: Good **Limitations: 1** Bias **Study Arm(s):** Single	**Sample size:** Intervention: 25 Control: 19 **Demographics:** **Intervention** Mean age: 83.0 yrs Gender: 76.0% female Race/ethnicity: NR SES: 91.7% low education Living Situation: 28.0% married or with partner Chronic condition(s): 60.0% with 3 or more chronic conditions, 48.0% heart disease; 72.0% have 4 or more medications/day **Comparison**	**Location (urbanicity):** The Netherlands (NR) **Intervention duration:** 3 mos **When intervention occurred:** 2013 **Intervention:** HDMS: new participants Frequency: 4-7 meals/week Content of meals: Participants provided with a high-quality dinner following dietary guidelines of the Netherlands Nutrition Centre Foundation; participants could also choose from three types of desserts: a healthy high-energy snack, protein-fortified juice, or a protein-fortified smoothie. 5- week menu cycle was used. Funding: self-pay	**Analysis:** Compared HDMS participants to non-HDMS participants. **Energy intake (kcal/d)** Intervention: baseline: 1596.0; f/u: 1737.0 Comparison: baseline: 1511.0; f/u: 1555.0 Difference between groups: 97.0 kcal/d (p= NS) **Protein intake (g/d)** Intervention: baseline: 65.4; f/u: 70.2 Comparison: baseline: 58.3; f/u: 62.5 Difference between groups: 0.6 g/d (p= NS) **Vitamin and mineral intake**

Study	Study Sample	Intervention Characteristics	Results
	Mean age: 84.0 yrs Gender: 78.9% female Race/ethnicity: NR SES: 76.5% low education	Meals delivered by local logistic service providers **Comparison**: maintained usual diet	Favorable: Vitamin C, Vitamin E, Folate, Calcium, Magnesium, Potassium, Sodium Unfavorable: Vitamin B1, Vitamin B2, Vitamin B6, Vitamin B12, Vitamin D, Iron **Handgrip strength (kg)** Intervention: baseline: 19.2; f/u: 20.4 Comparison: baseline: 19.8; f/u: 19.7 Adjusted difference between groups: 1.3 kg (p= NS) **Fat free mass (kg)** Intervention: baseline: 44.8; f/u: 46.3 Comparison: baseline: 46.8; f/u: 47.0 Adjusted difference between groups: 1.3 kg (p<0.05) **Health-related quality of life and well-being** Intervention: baseline: 57.4; f/u: 64.60 Comparison: baseline: 59.6; f/u: 62.0 Adjusted difference between groups: 4.8 (p= NS) **Paper conclusions**: Implementation of the meal service was successful and well-received by participants.
Author, Year: Dewar et al., 2020 **Study Design:** Single group pre-post **Suitability of Design**: Least **Quality of Execution**: Fair	**Sample size:** 399 **Demographics:** Mean age: 83.4 yrs Gender: 65.0% female Race/ethnicity: NR SES: NR Living Situation: 74.0% lives alone	**Location (urbanicity**): Hertfordshire, United Kingdom (NR) **Intervention duration:** ongoing, evaluation period 6 mos **When intervention occurred:** 2015-2018 **Intervention:** HDMS: existing participants Frequency: 3-7 meals/wk	**Analysis:** Compared study participants based on difference before and after the meal service. **Nutritional status (% malnourished or poorly nourished)** Baseline: 26.0%; f/u: 12.5% Difference: -13.5 pct pts

Study	Study Sample	Intervention Characteristics	Results
Limitations: 3 Description, data analysis, bias **Study Arm(s):** Single	Other Health Condition: 75.0% considered frail, 61.0% need walking aid	Content of meals: unknown; Participants received at least one nutrition and well-being visit from a dietitian, nutritionist, or nutrition and well-being specialist that provided tailored intervention approaches (e.g., nutrition by including higher energy meals, energy dense mini-meals or texture-modified meals). Funding: MOW and participant contributions Meals delivered by Hertfordshire Independent Living Service workers	**Paper conclusions**: HDMS recipients receiving the services maintained or improved their risk of malnutrition.
Author, Year: Frongillo et al., 2010 **Study Design:** Other design with concurrent comparison **Suitability of Design**: Greatest **Quality of Execution**: Fair **Limitations: 3** Description, confounding, other (content of meals not described) **Study Arm(s):** Single	**Sample size:** Intervention: 55 Control: 43 **Demographics:** Mean age: 78.1 yrs Gender: 77.9% female Race/ethnicity: 17.3% Non-White SES: 32.6% $\leq$100% of poverty level, 56.6% $\leq$ 125% of poverty or Food stamp eligible Living Situation: 58.8% live alone, 41.2% live with others	**Location (urbanicity):** New York, U.S. (NR) **Intervention duration:** 12 mos (6 mos data) **When intervention occurred:** 1999 **Intervention:** HDMS: new participants Frequency: 5 meals/wk Content of meals: unknown Funding: New York State Office for the Aging; community based long term care Meals delivered by meals service provider **Comparison**: received state offered Community-Based Long-Term Care services but no HDMS	**Analysis:** Compared study participants based on difference before and after the meal service. **Energy intake (kcal/d)** Intervention: baseline: 1337.0; f/u: 1349.1 Difference: 12.1 kcal/d **Protein intake (g/d)** Intervention: baseline: 57.0; f/u: 58.7 Difference: 1.7 g/d **Vitamin and mineral intake** Favorable: Vitamin A, Vitamin B1, Vitamin B2, Vitamin B3, Vitamin B6, Vitamin B12, Vitamin D, Vitamin E, Folate, Calcium, Iron, Magnesium No Change: Vitamin C **Food and Nutrition Security** Intervention: baseline: 23.2%; f/u: 13.1% Difference: -10.1 pct pts **Paper conclusions**: Those receiving HDMS improved dietary patterns and nutrient intake significantly more than those not receiving HDMS meals

Study	Study Sample	Intervention Characteristics	Results
Author, Year: Keller et al., 2006 **Study Design:** Other design with concurrent comparison **Suitability of Design**: Greatest **Quality of Execution**: Fair **Limitations: 4** exposure, data analysis, confounding, other (content of meals not described) **Study Arm(s):** Home-delivered meal services arm, congregate meal services arm	**Sample size:** HDMS: 74 Congregate meal service: 111 Comparison: 78 **Demographics:** **Intervention** Mean age: 78.7 yrs Gender: 76.4% female Race/ethnicity: NR SES: 68.0%<$20,000/y, 32.0% ≥ $20,000, 52.1% < high school, 47.9% graduated high school Living Situation: 76.4% live alone, 23.7% live with others Chronic Condition(s): 69.0% arthritis, 47.0% high blood pressure	**Location (urbanicity):** Ontario, Canada (NR) **Intervention duration:** 18 mos **When intervention occurred:** 1998-1999 **Intervention:** HDMS: existing participants Frequency: NR Content of meals: unknown Funding: community service agencies Meals delivered by local MOW and home care agencies Congregate meal service: existing participants Frequency: NR Content of meals: unknown Funding: community service agencies Meals delivered by congregate dining programs **Comparison**: no meal program	**Analysis:** Compared HDMS participants to nonparticipants Compared congregate meals service participants to nonparticipants **Nutritional status (% malnourished or poorly nourished)** Home-delivered meals services: 29.7% Comparison: 42.3% Difference: -12.6 pct pts Congregate meals service: 33.3% Comparison: 42.3% Difference: -9.0 pct pts **Paper conclusions**: HDMS or congregate meal services recipients scored higher on the Seniors in the Community: Risk Evaluation for Eating and Nutrition.
Author, Year: Kohrs et al., 1980 **Study Design:** Retrospective cohort **Suitability of Design**: Moderate **Quality of Execution**: Good **Limitations: 1** Confounding	**Sample size:** Intervention 2-5 meals/wk: 77 Intervention 1 meal/wk: 166 Control no meals/wk: 103 **Demographics:** **2-5 meals/wk arm** Age: 21.6% 59-69 yrs; 51.9% 70-79 yrs; 26.5% 80-99 yrs Gender: 67.9% female Race/ethnicity: NR SES: NR Living Situation: 21.6% married, 67.9% widowed, 10.5% other **1 meal per week arm**	**Location (urbanicity):** Missouri (rural and urban) **Intervention duration:** unknown **When intervention occurred:** before 1980 **Intervention:** 2-5 meals/wk arm Intervention: congregate meal service: existing participants Frequency: 2-5 meals/wk Funding: OAA Content of meals: unknown Meals delivered by congregate meal site 1 meal/wk arm	**Analysis:** 2-5 meals/wk arm: Compared participants who received 2-5 meals per week to participants who did not receive a meal service. 1 meal/wk arm: Compared participants who received 1 meal per week arm to participants who did not receive a meal service. **Energy intake (kcal/d)** 2-5 meals/wk arm f/u: 1,892.8 Comparison f/u: 1,856.2 Difference between groups: 36.6 kcal/d 1 meal/wk arm f/u: 1,809.1 Comparison f/u: 1,856.2 Difference between groups: -47.1 kcal/d

Study	Study Sample	Intervention Characteristics	Results
Study Arms: 2-5 meals per week arm; 1 meal per week arm	Age: 31.8% 59-69 yrs; 47.7% 70-79 yrs; 20.5% 80-99 yrs Gender: 68.2% female Race/ethnicity: NR SES: NR Living Situation: 43.8% married, 48.8% widowed, 7.4% other **Comparison** Age: 28.7% 59-69 yrs; 49.6% 70-79 yrs; 21.7% 80-99 yrs Gender: 69.8% female Race/ethnicity: NR SES: NR Living Situation: 39.5% married, 51.9% widowed, 8.5% other	Intervention: congregate meals service: existing participants Frequency: 1 meal/wk Funding: OAA Content of meals: unknown Meals delivered by congregate meal site **Comparison:** did not receive congregate meal service	**Protein intake (g/d)** 2-5 meals/wk arm f/u: 72.2 g/d Comparison f/u: 72.2 g/d Difference between groups: 0.0 g/d 1 meal/wk arm f/u: 69.4 g/d Comparison f/u: 72.2 g/d Difference between groups: -2.8 g/d **Poor diet rating (% of subjects)** 2-5 meals/wk arm f/u: 59.0% Comparison f/u: 76.6% Difference between groups: -17.6 pct pts 1 meal/wk arm f/u: 72.5% Comparison f/u: 76.6% Difference between groups: -4.1 pct pt **Vitamin and mineral intake** 2-5 meals/wk arm Favorable: Vitamin A, Vitamin B1, Vitamin B2, Vitamin B3, Vitamin C, Calcium, and Iron 1 meal/wk arm Favorable: Vitamin B3, Vitamin C, and Calcium Unfavorable: Vitamin A, Vitamin B1, Vitamin B2, and Iron **Paper conclusions**: Nutrition program associated with improvement in the nutritional status of participants.
Author, Year: Kretser et al., 2003 **Study Design:** RCT, but considered as two single group pre-post arms	**Sample size:** Meals Only Arm: 56 Meals Plus Snack Arm: 61 **Demographics:**	**Location (urbanicity):** Mecklenburg County, North Carolina (urban and rural) **Intervention duration:** ongoing, evaluation 6 mos **When intervention occurred:** before 2003	**Analysis:** Compared study participants based on difference before and after the meal service. **Nutritional status (% malnourished)** Meal only arm

Study	Study Sample	Intervention Characteristics	Results
Suitability of Design: Least **Quality of Execution**: Fair **Limitations**: 2, Description, data analysis **Study Arms**: Meals only arm; Meals plus snack arm	**Meals only arm** Age categories: 3.9% <65 yrs; 36.6% 65-74 yrs; 45.5% 75-84 yrs; 13.9%>85 yrs Gender: 73.3% female Race/ethnicity: 62.4% Black or African American, 38.0% White SES: 69.6% <high school Living Situation: 67.3% live with others Chronic conditions: 80.0% arthritis, 64.0% high BP, 28.0% diabetes **Meals plus snack arm** Age categories: 14.7%<65 yrs; 27.5% 65-74 yrs; 45.1% 75-84 yrs;12.7% >85yrs Gender: 68.6% female Race/ethnicity: 55.9% Black or African American, 44.1% White SES: 51.5% <high school Living Situation: 54.9% living with others Chronic conditions: 78.0% arthritis, 62.0% high BP, 29.0% diabetes	**Intervention:** HDMS: new participants Meals only arm Frequency: 5 meals/wk, delivered each day Content of meals: Met 1/3 of the daily recommended intakes as determined by the Dietary Guidelines for Americans Funding: Program, but participants could contribute if desired Meals delivered by MOW drivers Meals plus snack arm Frequency: 21 meals and 14 snacks delivered weekly + daily telephone calls to provide measure of safety and socialization Content of meals: Met 1/3 of the daily recommended intakes as determined by the Dietary Guidelines for Americans Funding: Program, but participants could contribute if desired Meals delivered by MOW drivers	Baseline: 29%; f/u: 22.9% Difference: -6.1 pct pts Meal plus snack arm Baseline: 23%; f/u: 12.2% Difference: -10.8 pct pts **Paper conclusions**: HDMS applicants have varying nutrition needs. By addressing nutritional risk, interventions can be targeted to meet these needs. A new, restorative, comprehensive meal program improved nutritional status and decreased nutritional risk and can possibly impact independence and functionality.
Author, Year: Kunvik et al., 2021 **Study Design:** RCT **Suitability of Design**: Greatest **Quality of Execution**: Good **Limitations: 1** Confounding	**Sample size:** Regular meal service arm: 24 High protein arm: 22 Control: 21 **Demographics:** **Regular meal service arm** Mean age: 78 yrs Gender: 67.0% female Race/ethnicity: NR SES: NR Living Situation: NR	**Location (urbanicity): Finland (NR)** **Intervention duration:** 2 mos **When intervention occurred:** after 2006 **Intervention:** Regular meal service arm: HDMS: new participants Frequency: 7 meals/wk delivered 2 times/wk Content of meals: meals followed Finnish nutrition guidelines; meals close to traditional meals. Rotating six-week meal plan.	**Analysis:** Compared HDMS participants to nonparticipants Compared high protein HDMS participants to nonparticipants **Energy intake (kcal/d)** Regular meal service arm: baseline: 1581.0; f/u: 1736.0 Comparison: baseline: 1567.0; f/u: 1574.0 Absolute difference in energy intake: 148.0 kcal/d (NS)

Study	Study Sample	Intervention Characteristics	Results
Study Arm(s): Regular meal service arm; High protein arm	**High protein arm** Mean age: 77 yrs Gender: 55.0% female Race/ethnicity: NR SES: NR Living Situation: NR **Comparison** Mean age: 79 yrs Gender: 57.0% Race/ethnicity: NR SES: NR Living Situation: NR	Funding: for-profit meal service; participants did not pay for any part of meals Meals delivered by same driver High protein arm: HDMS: new participants Frequency: 7 meals/wk delivered 2 times/wk Content of meals: meals followed Finnish nutrition guidelines but had higher protein content than regular meal service arm. Participants also provided a high protein snack and two slices of protein-enriched bread. Rotating six-week meal plan. Funding: for-profit meal service; participants did not pay for any part of meals Meals delivered by same driver **Comparison**: usual diet (no meal service), but participants were offered free meals for two weeks after last measurement.	High protein arm: baseline: 1582.0; f/u: 1767.0 Comparison: baseline: 1567.0; f/u:1574.0 Absolute difference in energy intake: 178.0 kcal/d (NS) **Protein intake (g/d)** Regular meal service arm: baseline: 68.8; f/u: 66.1 Comparison: baseline: 67.6; f/u: 64.9 Absolute difference in protein intake: 0 g/d (NS) High protein arm: baseline: 65.4; f/u: 74.8 Comparison: baseline: 67.6; f/u: 64.9 Absolute difference in protein intake: 12.1 g/d ($p<0.05$) **Vitamin and mineral intake** Regular meal service arm: Favorable: Calcium, Sodium High protein arm: Favorable: Calcium, Sodium **Handgrip strength (kg)** Regular meal service arm: baseline: 25.4; f/u: 25.3 Comparison: baseline:27.3; f/u: 26.9 Absolute difference in handgrip strength: 0.4 kg (NS) High protein arm: baseline: 28.8; f/u: 29.6 Comparison: baseline: 27.3; f/u: 26.9 Absolute difference in handgrip strength: 1.2 (NS) **Short physical performance battery (SPPB) total score** Regular meal service arm: baseline: 6.7; f/u: 7.4

Study	Study Sample	Intervention Characteristics	Results
			Comparison: baseline: 6.5; f/u: 7.0 Absolute difference in SPPB total score: 0.2 (NS) High protein arm: baseline: 8.1; f/u: 9.2 Comparison: baseline: 6.5; f/u: 7.0 Absolute difference in SPPB total score: 0.6 (NS) **Health-related quality of life (HRQoL)** Regular meal service arm: baseline: 0.8; f/u: 0.8 Comparison: baseline: 0.8; f/u: 0.8 Absolute difference in HRQoL: 0.02 (NS) High protein arm: baseline: 0.8; f/u: 0.8 Comparison: baseline: 0.8; f/u: 0.8 Absolute difference in HRQoL: 0.05 (NS) **Paper conclusions**: protein-rich HDMS including snack and bread had more benefits on the nutrition and physical performance of older people (>65 years) compared to regular HDMS and comparison group.
Author, Year: Luscombe-Marsh et al., 2014 **Study Design:** Retrospective cohort **Suitability of Design**: Moderate **Quality of Execution**: Fair **Limitations: 4** Description, exposure, confounding, other	**Sample size** Intervention: 28 Control: 142 **Demographics** <u>Intervention</u> Mean age: 83 yr Gender: 78.6% female Race/ethnicity: NR SES: NR Living situation: 71.4% lives alone Chronic disease: 50.0% cardiovascular disorder, 25.0% diabetes	**Location (urbanicity):** Adelaide, Australia (urban) **Intervention duration:** ongoing; evaluation was 12 mos **When intervention occurred:** 2000-2001 **Intervention:** HDMS: existing participants Frequency: NR Content of meals: not described Funding: Australian government Meals delivered by: NR **Comparison**: individuals not receiving the meal service	**Analysis:** Compared participants who received a meal service to nonparticipants **Nutritional status (% malnourished)** Intervention: after meal service: 6.8% Comparison: after meal service: 11.3% Difference between groups: -4.4 pct pts **Paper conclusions**: Providing MOW to nutritionally vulnerable older people may not prevent age-related decline in health.

Study	Study Sample	Intervention Characteristics	Results
(content of meals not provided) **Study Arm(s):** Single	Control Mean age: 78 yr Gender: 71.3% female Race/ethnicity: NR SES: NR Living situation: 63.3% lives alone Chronic disease: 62.0% cardiovascular disorder, 21.5% diabetes mellitus		
Author, Year: Marceaux, 2012 **Study Design**: Single group pre-post **Suitability of Design**: Least **Quality of Execution** Good **Limitations**: **1** Exposure **Study Arm(s)**: Single	**Sample size:** 40 **Demographics:** Mean age categories: 65-74 yrs: 47.5%; 75-84 yrs: 50.0%; 85-94 yrs: 0%; 95-100 yrs: 2.5% Gender: 77.5% female Race/ethnicity: 2.5% American Indian/Alaska Native; 37.5% Black or African American, 20.0% Hispanic, 40.0% White, SES: 95.0% considered low income Living Situation: 42.5% live with others	**Location (urbanicity):** Austin, TX (urban) **Intervention duration:** ongoing, evaluation was 3 mos **When intervention occurred:** 2006-2012 **Intervention:** HDMS: new participants Frequency: NR Content of meals: Followed Dietary Guidelines for Americans Funding: OAA Meals delivered by: NR	**Analysis:** Dietary intake was compared in a group of participants before and 3 mos after enrolling in the meal service. **Percent meeting recommended daily allowance for energy** Baseline: 47.5%; f/u: 40.0% Difference: -7.5 pct pts (NS) **Percent meeting recommended daily allowance for protein** Baseline: 82.5%; f/u: 72.5% Difference: -10.0 pct pts (NS) **Energy intake (kcal/d)** Baseline and f/u: NR Difference: -240.0 kcal/d (NS) **Protein intake (g/d)** Baseline and f/u: NR Difference: -3.1 g/d (NS) **Nutrition status (% malnourished or poorly nourished)** Baseline: 32.5%; f/u: 7.5% Difference: 25.5 pct pts ($p<0.05$) **Vitamin and mineral intake:** Favorable: Vitamin A, Vitamin B6, Vitamin C, Sodium

Study	Study Sample	Intervention Characteristics	Results
			Unfavorable: Vitamins B1, Vitamin B2, Vitamin B3, Vitamin B12, Vitamin K, Folate, Calcium No change: Vitamin E, Iron, Magnesium, Potassium **Paper conclusions**: quality of diet improved after receiving meals
Author, Year: Millen et al., 2002 **Study Design:** Retrospective cohort **Suitability of Design**: Moderate **Quality of Execution**: Fair **Limitations: 2** Exposure, bias **Study Arm(s):** Single	**Sample size:** Intervention: 1850 **Demographics:** Intervention Mean age: 76.9 yrs Gender: 69.4% female Race/ethnicity: 1.2% American Indian, 0.6% Asian or Pacific Islander, 14.5% Black or African American, 6.1% Hispanic, 78.1% White SES: 54.0% less than high school, 25.0% High school/GED, 40.2% <100% of federal poverty level, 15.5% low-income minority Living Situation: 28.2% married or with partner, 54.3% widowed, 58.3% live alone Chronic condition(s): 2.7% diagnosed with a chronic condition 0.9% ADL impairments 1.1% IADL impairments	**Location (urbanicity):** National sample in the US (urban and rural) **Intervention duration:** NR **When intervention occurred:** Between 1992-2002 **Intervention:** HDMS or congregate meals services: existing participants Frequency: NR Content of meals: followed Dietary Guidelines for Americans Funding: OAA Meals delivered by area agencies on aging and a nutrition project for home-delivered meals and in community settings (senior centers, community organizations and facilities) for congregate meals **Comparison**: maintained usual diet	**Analysis:** Compared a group of participants who received a meal service to a group of nonparticipants **Vitamin and mineral intake** Favorable: Vitamin A, Vitamin B1, Vitamin B2, Vitamin B3, Vitamin B6, Vitamin B12, Vitamin C, Vitamin D, Vitamin E, Folate, Calcium, Iron, Magnesium **Loneliness and social contacts** Intervention f/u: 97.2% Comparison f/u: 83.0% Difference between groups: 14.2 pct pts ($p<0.001$) **Paper conclusions**: HDMS and congregate meals service recipients improved nutritional intake and socialization.
Author, Year: Neyman et al., 1996	**Sample size:** Intervention: 70 Comparison: 65	**Location (urbanicity):** California (urban and rural) **Intervention duration:** unknown	**Analysis:** Compared participants who received congregate meal services to nonparticipants

Study	Study Sample	Intervention Characteristics	Results
Study Design: Retrospective cohort **Suitability of Design**: Moderate **Quality of Execution**: Fair **Limitations: 3** Sampling, exposure, confounding **Study Arm(s):** Single	**Demographics:** Intervention Mean age: 73.0 yrs Gender: 67.0% female Race/ethnicity: 2.8% Asian, 5.7% Hispanic or Latino, 91.4% White SES: 71.8% <$25,000 per year Comparison Mean age: 73.1 yrs Gender: 68.0% female Race/ethnicity: 1.5% American Indian or Alaskan Native, 6.2% Asian, 1.5% Hispanic or Latino, 89.2% White SES: 40.0% <$25,000 per year	**When intervention occurred:** before 1996 **Intervention:** Congregate meal service: existing participants Frequency: unknown Content: unknown Funding: OAA Meals delivered at congregate meal program site **Comparison**: Did not participate in congregate meal program.	**Energy intake (kcal/d)** Intervention f/u: 1634.0 Comparison f/u: 1742.0 Difference between groups: -108.0 kcal/d (NS) **Protein intake (g/d)** Intervention f/u: 67.6 Comparison f/u: 72.5 Difference between groups: -4.9 g/d (NS) **Vitamin and mineral intake:** Favorable: Vitamin B3 Unfavorable: Vitamin B1, Vitamin B2, Calcium, Iron No change: Vitamin A, Magnesium **Hemoglobin (g/100mL)** Males Intervention f/u: 14.1 Comparison f/u: 14.6 Difference between groups: -0.5 g/100mL (NS) Females Intervention f/u: 14.4 Comparison f/u: 12.4 Difference between groups: 2.0 g/100mL (NS) **Paper conclusions**: Congregate meal service programs did not significantly affect the nutritional status of the population; author notes that congregate meal service programs may prevent substantial nutritional inadequacy in the elderly population.

Study	Study Sample	Intervention Characteristics	Results
Author, Year: O'Leary et al., 2020 **Study Design:** Single group pre-post **Suitability of Design**: Least **Quality of Execution**: Fair **Limitations: 2** Sampling, data analysis **Study Arm(s):** Single	**Sample size:** 24 **Demographics:** Mean age: 78.3 yrs Gender: 57.9% female Race/ethnicity: NR SES: NR Living Situation: 63.2% live with others	Location (urbanicity): United Kingdom (rural) Intervention duration: 0.75m When intervention occurred: NR Intervention: HDMS: Frequency: 3 meals/d; 7 d/wk (a total of 21 meals/wk) Content of meals: met Australian home delivered meal guidelines for protein and energy intake. Participants were provided a menu with 4 breakfast choices, 22 main course choices and 4 supper choices. Meals were suitable for home refrigeration and usually delivered twice per week, with three meals being provided for each day. All meals that were intended to be consumed hot were suitable for microwaving or oven heating. Participants were instructed to consume additional meals and snacks ad libitum. Funding: NR Meals delivered by delivery driver	**Analysis:** Dietary intake was compared in a group of participants before and 0.8 mos after enrolling in the meal service. **Nutrition status (% malnourished status)** Baseline: 47.0%; f/u: 15.8% Difference: -31.2 pct pts (p<0.05) **Handgrip strength (kg)** Males Baseline: 29.1 kg; f/u: NR Difference: "no significant change" Females Baseline: 21.1 kg; f/u: NR Difference: "no significant change" **Loneliness** (Modified UCLA loneliness scale [ranges 1 to 4 with higher score indicating greater loneliness]) Baseline: 1.7; f/u: 1.6 Difference: -0.1 (p=0.55) **Depression** (Geriatric Depression Scale Scores range 0-12, with higher score indicating greater level of depression) Baseline: 2.2; f/u: 1.8 Difference: -0.4 (p<0.05) **Satisfaction with life** (higher scores indicate greater satisfaction with life) Baseline: 4.0; f/u: 4.1 Difference: 0.03 (NS) **Paper conclusions**: Even short-term, home meal deliveries improve min-nutritional assessment scores and can positively alter some measures of mood.

Study	Study Sample	Intervention Characteristics	Results
Author, Year: Park et al., 2007 **Study Design:** Other design with concurrent comparison **Suitability of Design**: Greatest **Quality of Execution**: Fair **Limitations: 2** Data analysis, confounding **Study Arm(s):** Single	**Sample size:** Intervention: 22 Comparison: 22 **Demographics:** <u>Intervention</u> Mean age: 75.6 yrs Gender: 100.0% female Race/ethnicity: 100% Asian SES: 100.0% low income Living situation:100.0% live alone Health conditions: 13.6% taking "Oriental" medication <u>Comparison</u> Mean age: 73.1 yrs Gender: 100.0% female Race/ethnicity: 100.0% Asian SES: 100.0% low income Living situation: 100.0% live alone Health condition: 9.1% taking "Oriental" medication	**Location (urbanicity):** Bucheon City (suburb of Seoul), South Korea **Intervention duration:** 8 mos **When intervention occurred:** June 2001-January 2002 **Intervention:** HDMS: new participants Frequency**:** 5-7 meals/wk Content of meals: provided fish, eggs, soybean products, fruits, vegetables, dairy products, and/or cereals Funding: local government and participant contributed $5/wk Meals delivered by a dietician from the local government-funded elderly food assistance program **Comparison**: usual diet	**Analysis:** Compared HDMS participants to non-HDMS participants **Percent meeting recommended daily allowance for energy** Intervention: baseline: 59.0; f/u: 68.0 Comparison: baseline: 76.0; f/u: 78.0 Difference between groups: 7.0 pct pts (NS) **Percent meeting recommended daily allowance for protein** Intervention: baseline: 64.0; f/u: 73.0 Comparison: baseline: 83.0; f/u: 79.0 Difference between groups: 13.0 pct pts (NS) **Energy intake (kcal/d)** Intervention: baseline: 948.8; f/u: 1012.5 Comparison: baseline: 1301.0; f/u: 1251.0 Difference between groups: 113.7 kcal/d (NS) **Protein intake (g/d)** Intervention: baseline: 35.6; f/u: 40.7 Comparison: baseline: 48.3; f/u: 48.3 Difference between groups: 5.1 g/d (NS) **Vitamin and mineral intake** Favorable: Vitamin A, Vitamin C, Calcium, Iron, Potassium, Sodium Unfavorable: Vitamin B3 No Change: Vitamin B1, Vitamin B2 **Paper conclusions**: HDMS recipients significantly improved nutritional intake and mental health associated with the degree of depression, decreased body

Study	Study Sample	Intervention Characteristics	Results
			percent fat, and increased high-density lipoprotein cholesterol.
Author, Year: Roy et al., 2006 **Study Design:** Other design with concurrent comparison **Suitability of Design**: Greatest **Quality of Execution**: Fair **Limitations: 2** Confounding, other (content of meals not provided) **Study Arm(s):** Single	**Sample size:** Intervention: 20 Control: 31 **Demographics:** Intervention Mean age: 75.2 yrs Gender: 85.0% female Race/ethnicity: 100% Asian SES: 50.0% low income, 45.0% graduated from high school, 5% technical college/university experience Living situation: 65.0% live alone Health condition: 70.0% arthritis, 70% vascular disorders, 65% digestive disorders Comparison Mean age: 77.2 yrs Gender: 81.0% female Race/ethnicity: 100% Asian SES: 48.0% low income, 29.0% graduated from high school, 23.0% technical college/university experience Living situation: 74.0% live alone Health condition: 84.0% arthritis, 68% vascular disorders, 42% digestive disorders	**Location (urbanicity):** Sherbrooke, Canada (NR) **Intervention duration:** ongoing, evaluation period was 2 mos **When intervention occurred:** before 2006 **Intervention:** HDMS: new participants Frequency: 2-3 meals/week Content of meals: Suggested home-delivered meals comply with dietary guidelines but no specifics on these meals. Funding: NR Meals delivered by dietician **Comparison**: maintained usual diet	**Analysis:** Compared HDMS participants to non-HDMS participants. **Energy intake (kcal/day)** Intervention: baseline: 1192.0; f/u: 1313.0 Comparison: baseline: 1277.0; f/u: 1256.0 Difference between groups: 142.0 kcal/d (p=0.1) **Protein intake (g/d)** Intervention: baseline: 47.4; f/u: 54.8 Comparison: baseline: 51.1; f/u: 50.4 Difference between groups: 8.10 g/d (p=0.03) **Vitamin and mineral intake** Favorable: Vitamin A, Vitamin B1, Vitamin B3, Vitamin B6, Vitamin C, Vitamin D, Vitamin E, Calcium, Magnesium Unfavorable: Vitamin B2, Vitamin B12, Folate No Change: Iron **Paper conclusions**: HDMS improved dietary intake of participants.
Author, Year: Steele et al., 1985 **Study Design:** Retrospective cohort **Suitability of Design**: Moderate	**Sample size:** Intervention: 32 Control: 22 **Demographics:** Intervention Mean age: 78 yrs Gender: 83.3% female	**Location (urbanicity):** North Carolina (NR) **Intervention duration:** NR **When intervention occurred:** before 1985 **Intervention:** HDMS: existing participants Frequency: 1 meal/d, for 5 d/wk (5 meals/wk) Content of meals not described	**Analysis:** Compared HDMS participants to non-HDMS participants. **Percent meeting recommended daily intake of energy** Intervention: 41% Comparison: 47%

Study	Study Sample	Intervention Characteristics	Results
Quality of Execution: Fair **Limitations: 3** Sampling, confounding, other (content of meals not described) **Study Arm(s):** Single	Race/ethnicity: 45.0% Black or African American, 55.0% White SES: NR <u>Comparison</u> Mean age: 76 yrs Gender: 83.3% female Race/ethnicity: 45.0% Black or African American, 55.0% White SES: NR	Funding: NR Meal delivered by: NR **Comparison**: Individuals on a waiting list to receive the meal program.	Difference between groups: -6 pct pts (NS) **Percent meeting recommended daily intake of protein** Intervention: 69% Comparison: 73% Difference between groups: -4 pct pts (NS) **Energy intake (kcal/d)** Intervention: 1187 Comparison: 1371 Difference between groups: -184 kcal/d (NS) **Protein intake (g/d)** Intervention: 58 Comparison: 54 Difference between groups: 4 g/d (NS) **Vitamin and mineral intake** Favorable: Vitamin B3, Sodium Unfavorable: Vitamin A, Vitamin B1, Vitamin C, Calcium, Iron, Potassium No Change: Vitamin B2 **Nutrition status (% malnourished or poorly nourished)** Intervention: 44% Comparison: 27% Difference between groups: -17 pct pts (NS) **Paper conclusions**: Provision of nutrition services to homebound elderly appears to be lagging behind need.

Study	Study Sample	Intervention Characteristics	Results
Author, Year: Ullevig et al., 2018 **Study Design:** Single group pre-post **Suitability of Design**: Least **Quality of Execution:** Fair **Limitation(s): 3** Sampling, exposure, Loss to follow-up **Study Arm(s):** Single	**Sample size:** Intervention: 49 **Demographics:** Intervention Mean age: 77.2 yrs Gender: 59.2% female Race/ethnicity: 30.6% Black or African American, 18.4% Hispanic or Latino, 51.0% White SES: NR	**Location (urbanicity):** Austin and San Antonio, TX (NR) **Intervention duration:** ongoing but evaluation was 3 mos **When intervention occurred:** November 2014-April 2015 **Intervention:** HDMS: new participants Frequency: 1 meal/d; NR how many days/wk Content of meals: Followed Dietary Guidelines for Americans Funding: NR Meals delivered by MOW	**Analysis:** Dietary intake was compared in a group of participants before and 3 mos after enrolling in the meal service. **Percent meeting recommended daily allowance for energy** Baseline: 37.2%; f/u: 39.5% Difference: 2.3 pct pts (NS) **Percent meeting recommended daily allowance for protein** Baseline: 62.8%; f/u: 67.4% Difference: 4.6 pct pts (NS) **Energy intake (kcal/d)** Baseline and f/u: NR Difference: -60.5 kcal/d (NS) **Protein intake (g/d)** Baseline and f/u: NR Difference: -5.8 g/d (NS) **Nutrition status (% malnourished or poorly nourished)** Baseline: 41.7%; f/u: 8.3% Difference: -33.4 pct pts ($p<0.05$) **Vitamin and mineral intake** Favorable: Vitamin D, Vitamin E, and Folate; Calcium, Magnesium, Sodium Unfavorable: Vitamin B3, Vitamin B12, Vitamin C No change: Vitamins A, Vitamin B1, Vitamin B2, Vitamin B6, and Vitamin K, Iron, Potassium **Paper conclusions**: positive associations between homebound older adults'

Study	Study Sample	Intervention Characteristics	Results
			nutritional status and 3 months of participation in HDMS
Author, Year: Walden et al., 1989 **Study Design:** Retrospective self-controlled **Suitability of Design**: Moderate **Quality of Execution**: Good **Limitations: 1** Sampling **Study Arm(s):** Single	**Sample size:** Intervention: 16 **Demographics:** Mean age: 81.4 yrs Gender: 75.0% female Race/ethnicity: 31.3% Black or African American, 68.8% White SES: 18.8% receive food stamps Living situation: 81.3% live alone	**Location (urbanicity):** Southern state in U.S. (NR) **Intervention duration:** NR **When intervention occurred:** data collected 1985-86 **Intervention:** HDMS: existing participants Frequency: 7 meals/wk (daily weekday meals plus two additional meals on Friday to consume over the weekend) Content of meals: unknown Funding: OAA Meals delivered by volunteers (often had to pay drivers for weekend delivery)	**Analysis:** Dietary intake is compared on a day participants received a meal to a day they did not receive a meal **Percent meeting recommended daily allowance for energy** Day with meal: 44.0% Day without meal: 19.0% Absolute difference: 25.0 pct pts (NR) **Percent meeting recommended daily allowance for protein** Day with meal: 94.0% Day without meal: 44.0% Absolute difference: 50.0 pct pts (NR) **Energy intake (kcal/d)** Day with meal: 1719.8 Day without meal: 1314.1 Absolute difference: 405.7 kcal/d (NR) **Protein intake (g/d)** Day with meal: 108.0 Day without meal: 89.6 Absolute difference: 18.4 g/d (NR) **Vitamin and mineral intake** Favorable: Vitamin A, Vitamin B1, Vitamin B2, Vitamin C, Calcium, Iron Unfavorable: Vitamin B3 **Paper conclusions**: Persons receiving HDMS 5 d/wk had insufficient dietary intake of protein and select vitamins and minerals, demonstrating need for weekend meals.

Study	Study Sample	Intervention Characteristics	Results
Author, Year: Walton et al., 2015 **Study Design:** Retrospective self-controlled **Suitability of Design**: Moderate **Quality of Execution**: Fair **Limitations: 2** Sampling, other (content of meals not described) **Study Arm(s):** Single	**Sample size:** Intervention: 42 **Demographics:** Mean age: 81.9 yrs Gender: 61.9% female Race/ethnicity: NR SES: NR Living Situation: NR Existing health condition: 14.0% reported cognitive disorder	**Location (urbanicity):** New South Wales, Australia (urban) **Intervention duration:** ongoing **When intervention occurred:** 2011 **Intervention:** HDMS: existing participants Frequency: 6 to 14 meals over a 2-week period; Hot or frozen meals were available for weekdays, and frozen meals were delivered if weekends were chosen. Content of meals: NR Funding: program Meals delivered by volunteer MOW drivers	**Analysis**: Dietary intake is compared on a day participants received a meal to a day they did not receive a meal **Percent meeting recommended daily allowance for energy** Day with meal: 54.5% Day without meal: 48.5% Absolute Difference: 6.0 pct pts (NR) **Percent meeting recommended daily allowance for protein** Day with meal: 84.8% Day without meal: 75.8% Absolute Difference: 9.0 pct pts (NR) **Energy intake (kcal/day)** Day with meal: 1818.4 Day without meal: 1811.0 Absolute Difference: 7.4 kcal/d (NR) **Protein intake (g/d)** Day with meal: 78.2 Day without meal: 80.9 Absolute Difference: -2.7 g/d (NR) **Paper conclusions**: Meal participants are at risk of being poorly nourished and meals delivered by the service provide an important contribution to overall intakes.
Author, Year: Wright et al., 2015 **Study Design:** Single group pre-post **Suitability of Design**: Least **Quality of Execution**: Fair	**Sample size:** *Baseline* Intervention: 51 **Demographics:** <u>Intervention</u> Mean age: 74.1 yrs Gender: 66.0% female Race/ethnicity: 58.0% White, 22.6% Black or African American; 19.4% Hispanic or Latino SES: NR	**Location (urbanicity):** central FL, U.S. (NR) **Intervention duration:** 2 mos evaluation, but intervention ongoing **When intervention occurred:** 2014 **Intervention:** HDMS: new participant Frequency: at least 3 meals/wk Content of meals: Followed Dietary Guidelines for Americans Participants were homebound Funding: NR Meals delivered by MOW program	**Analysis:** Within-participant comparison (pre-post meal program) **Energy intake (kcal/d)** Baseline: 1264.4; f/u: 1620.0 Difference: 355.6 kcal/d ($p<0.05$) **Protein intake (g/d)** Baseline: 54.1; f/u: 73.7 Difference: 19.6 g/d ($p<0.05$)

Study	Study Sample	Intervention Characteristics	Results
Limitations: 2 Sampling, data analysis **Study Arm(s):** Single			**Nutrition status (% malnourished pr poorly nourished)** Baseline: 33.9%; f/u: 5.9% Difference: -28.0 pct pts (p<0.05) **Food and nutrition security (food secure)** Baseline: 30.6%; f/u: 0.0% Difference: -30.6 pct pts (p<0.05) **Loneliness (3-13, higher score greater loneliness)** Baseline: 4.1; f/u: 2.7 Difference: -1.4 (p<0.001) **Paper conclusions**: Statistically significant improvements across all measures after 2 mos of HDMS