The Army Eating Environment: Current Nutritional and Behavioral Concerns

Adrienne Hatch, MS, RD, CSSD
MAJ Julianna Jayne, PhD, RDN, CHES

U.S. Army Research Institute of Environmental Medicine
Military Nutrition Division

The opinions or assertions contained herein are the private views of the author(s) and are not to be construed as official or as reflecting the views of the Army or the Department of Defense.

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Outline

• The Army as a population
• Dietary guidelines for military personnel
• Military feeding today and current challenges
• Body weight concerns
• Military-specific eating behaviors
• Eating behavior research efforts and findings
• Conclusion

Army Demographics

Data taken from the 2017 DoD Demographics Report

Soldiers Eat in Many Places

Data taken from: Black and Military Data Repository, 2011-2014
Dietary Guidelines for Military Personnel

Nutrition Standards for Military Feeding to Support Human-Performance Optimization
- Defines nutritional responsibilities of the Army, Navy, Air Force
- Includes recommended nutrient standards = Military Dietary Reference Intakes (MDRI’s)
- Implements DoD menu standards
- Nutritional standards for rations
- Energy expenditure under various environmental conditions (cold, hot, high altitude)
- Establishes basic nutrition education standards for initial military training programs across Services

Past US Military Field Feeding

WW2 – expanded catalog of 23 different combat rations
- Individual
  - C Ration – 1 day (3 meals, ~ 3,800 Kcal/d)
  - D Ration – 600 Kcal survival bar
  - K Ration – 1 meal (~ 2,800 Kcal), compact, easy-to-carry, for paratroopers
- Group – special purpose
  - Mountain & Jungle Rations
  - 10 in 1 & 5 in 1, Squad/Crew Air Crew Lunch
  - Lifeboat

R&D Innovations
- Packaging – shelf stability, safety
- Weight/Cube reduced
- Situationaly specific rations
- Nutrient requirements as per 1941 RDAs

Under-consumption with Field Feeding: Recommendations vs Reality

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES
Committee on Military Nutrition Research
1995

- Eating behavior
  - Consumer preferences, menu fatigue
  - Limited time & unappealing places to eat
- Food availability constraints
  - Remote operations & austere logistics/resupply
  - Size & Weight limit amount of rations carried
  - 1 MRE ~ 1 lb
  - 3 MRE / day
  - 3,900 Kcal
  - Carb: 507 g
  - Protein: 137 g
  - Fat: 147 g

Expedient solution: field stripping MREs

Hard to Match Energy Intake to High Warfighter TDEEs

Warfighters in high-intensity combat operations unlikely to consume > 3 MRE/day

Military Dietary Reference Intakes (MDRI’s)

- Energy Requirements Take into Consideration:
  - MDRI calculation
  - Body size
  - Physical activity
  - Environmental factors
  - Clothing and equipment
  - Terrain
  - Metabolic adjustments

- Nutrient requirements listed include:
  - Carbohydrate
  - Protein
  - Fat
  - Fiber
  - Iron

- Water, sodium, & CHO electrolyte beverages
  - Fluid requirements for various work intensities, temperatures, altitudes, clothing worn
  - Guidance on sodium requirements

Physiological Analysis of Marines During Mountain Warfare Training

Purpose: To better understand the physiological impact of Marines training in summer and winter mountain operations by measuring:
- Calorie expenditure and intake
  - Doubly labeled water, combat ration intake logs, dietary recalls
- Body weight and muscle mass
  - Bioelectrical impedance
- Anabolic hormones, inflammation, and nutrition-health status
  - Blood draws
- Physical performance testing
  - beep test, sprint test, vertical jump

Data collected before (PRE), during (MID), after (POST) 30 day training in summer and winter
Current Field Feeding Options

First Strike Ration
~2900 kcals/day

Meal, Ready to Eat
~1300 kcals/meal

Unisized Group Rations - Express
~1300 kcals/meal

Special Purpose Rations
~1540 kcals/day

Cold Weather
~4620 kcals/day

Long Range Patrol
~1050 kcals/pack

Carbo Pack
~380 kcals/pack, 75 g CHO

Garrison feeding

- Approximately 74% of non-deployed military personnel consume at least 1 meal/day in military dining facilities (DFAC)³
- Labelling “healthy” entrees in an Army DFAC did not effectively increase sales of those items, but taste and food quality did²
- Soldier intake is less than ideal with low fruit, vegetable, nutrient-rich food consumption in an ad lib environment¹,³
- Modest menu enhancements in a DFAC intervention showed reductions in energy intake, total fat, % energy from fat and saturated fat⁴

Special Operations Forces that expended 140% energy expended by typical garrison soldiers⁵

Influencing Nutritious Behaviors in the Garrison Environment

Cole et al., J Nutr Educ Behav; 2018

Implementing a Performance-Based Menu Improved Diet Quality

Healthy Eating Index Score

Based upon energy density at 1000 kcal higher score is better

49.1
56.7
60.1

*p = .002 pre-post intervention

• No change in the control DFAC over time
• HEI score for intervention DFAC 1-3 points over time which was significant
• ↑ in whole fruits, total protein, seafood and plant protein
• ↓ in total vegetables, dairy, fatty acids

Weight for Height Table

Army Regulation 600-9; 2013

<table>
<thead>
<tr>
<th>Height (inches)</th>
<th>Male weight in pounds, by age</th>
<th>Female weight in pounds, by age</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-20</td>
<td>21-27</td>
<td>28-39</td>
</tr>
<tr>
<td>50-52</td>
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<td>53-54</td>
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<td>55-56</td>
<td>170</td>
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<td>57-58</td>
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<td>59-60</td>
<td>170</td>
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<td>61-62</td>
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<td>65-66</td>
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<tr>
<td>67-68</td>
<td>170</td>
<td>170</td>
</tr>
</tbody>
</table>

* Army Regulation 600-9; 2013
Army Weight & Body Composition Standards

<table>
<thead>
<tr>
<th>Age Category (y)</th>
<th>Upper Limit BMI</th>
<th>Relative Body Fat %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;21</td>
<td>25.9</td>
<td>20</td>
</tr>
<tr>
<td>21-27</td>
<td>26.5</td>
<td>22</td>
</tr>
<tr>
<td>28-39</td>
<td>27.2</td>
<td>24</td>
</tr>
<tr>
<td>&gt;40</td>
<td>27.5</td>
<td>26</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;21</td>
<td>25.0</td>
<td>30</td>
</tr>
<tr>
<td>21-27</td>
<td>25.3</td>
<td>32</td>
</tr>
<tr>
<td>28-39</td>
<td>25.6</td>
<td>34</td>
</tr>
<tr>
<td>&gt;40</td>
<td>26.0</td>
<td>36</td>
</tr>
</tbody>
</table>

Overall objective: To promote regular fitness and nutrition habits that ensure a physically capable force ready to deploy at any time.1

Compliance with Army Weight-for-Height Retention Guidelines

<table>
<thead>
<tr>
<th>% Classified as Overweight or Obese by BMI by Sex and Age</th>
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<td>% of Soldiers Who Exceeded the Authorized Weight for the Height and Age</td>
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<td>Men</td>
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47% of women and 50% of men do not meet the screening weight for height and age standards.

Impact of Obesity in Military Population

- Impact of military lifestyle on body weight
  - Requirement to meet weight and fitness standards protects or prevents service members from excessive weight gain
  - Job-related stress may result in negative impact on physiological and physical health (military personnel and dependents)

- Impact of overweight and obesity on military performance
  - Decrements in physical performance
  - Increased absenteeism
  - Increased risk of chronic diseases
  - Cognitive decline
  - Increase health care costs
  - Threat to national security

Medical care for obese costs were $1,429 higher than those of normal weight.

Ineligibility of Military Applicants

- Approximately 9% of active duty enlisted applicants were disqualified due to obesity (based on ICD-9 code).1
- Approximately 16% of active duty enlisted applicants were disqualified due to weight, body build (based on "other medical failure" codes from U.S. Military Entrance Processing Command).1
- Existing recruitment and accessions standards are not posing challenges to recruitment goals per each Service’s Recruit Commands.2

Weight status of Army Enlistees

- Objectives: identify changes in weight status at Army entry from 1989 to 2012, and the demographic characteristics associated with overweight/obesity.
- Prevalence of exceeding the screening table weights increased with time (5.7% in 1989, 22% in 1992, high of 31% in 2006 and 2007, ~25% in 2012).
- Demographic predictors (2008-2012):
  - women less likely to exceed the guidelines compared to men
  - women 20-29 or 30-39 years more likely to exceed guidelines vs. <20 years

Medical care for obese costs were $1,429 higher than those of normal weight.
**DoD Efforts**

**Why We Need Research**

- DoD Health-Related Behavior Survey (N=15,747)
  - Food Intake
    - Fruit: 20% vs. 7%
    - Vegetables: 26% vs. 9%
    - Whole grains: 28% vs. 11%
    - Low-fat dairy: 28% vs. 12%
    - Snack food/sweets: 23% vs. 10%
    - Fast food: 14% vs. 6%

  Soldiers who met Healthy People 2010 guidelines for food intake: 2.5%

**Nutrition, Health, & Performance**

- Food choice behaviors form the basis of nutritional fitness
- Nutritional fitness influences body composition, psychological status, and overall health
- Optimal health is key to physical performance
- Soldiers must be ready to optimally perform

**Research Efforts**

**Military Culture**

**Body Composition Program: Weight Cycling**

**Stress: Nutrition-Related Health Outcomes**

- Stressful life changes
  - Marriage/divorce
  - Relocation
  - Birth/adoption of child
  - Deployment
  - Demotion/Promotion
  - Develop a physical duty limitation

- Stress Response
  - Physiological changes
  - Blood pressure changes
  - Hyperlipidemia
  - Separation for failure to meet body comp standards

- Stress can lead to
  - Increased body mass
  - Medical conditions
  - Poor performance

**Outcomes**

- Stressful life changes
  - Marriage/divorce
  - Relocation
  - Birth/adoption of child
  - Deployment
  - Demotion/Promotion
  - Develop a physical duty limitation

**Results**

1 mo. after marriage: women: 68% higher odds of having substantial weight gain; men: 23%
2 mo. after developing a physical duty limitation: women: 83% higher odds of having a hyperlipidemia dx; men: 42%

Examples of weight cycling in Soldiers, N=7,208 men; 7,069 women

Jayne et al., Preventive Medicine Reports, 2019
Physiological Cues: Stress and Emotions

- 48% of male Soldiers report emotional eating sometimes or often compared to 68% of female Soldiers (N=1,460, p=0.0011)
  - BMI is significantly different depending on frequency of emotional eating behaviors (p<0.01).
  - Those who report emotional eating behaviors sometimes or often had BMIs that were 0.73 or 1.42 points higher, respectively.

Physiological Cues: Intuitive Eating

- Normal weight status in military service members was associated with intuitive eating characteristic (N=295)
- More males ate for physical rather than emotional reasons than female Soldiers (p = 0.014)
  - Disparity between sex and intuitive eating characteristic
- Each 1-point increase in Reliance on Internal Hunger Satiety Score was associated with 34% lower odds of being overweight
- Increasing awareness of eating influences may improve weight-related dietary behaviors

Nutrition Knowledge

- Army typically employs standard nutrition education strategies
  - Those with a greater affiliation with a healthy eating identity may be more receptive to these strategies*
    - “I am a healthy eater.”
    - “I am someone who eats in a nutritious manner.”
    - “I am someone who is careful about what I eat.”
- Does nutrition knowledge or affinity with a healthy eating identity better predict “healthy” food choice behaviors? (n=575)**
  - Skipping meals, eating out, and higher fruit and vegetable intake

Opportunities for Change

- A healthy eating identity was a better predictor of healthy food choice behaviors

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Fruit and Veg Intake (B, p)</th>
<th>Skipping Meals (B, p)</th>
<th>Eating Out (B, p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Eating ID</td>
<td>0.25, &lt;0.01</td>
<td>-0.31, &lt;0.01</td>
<td>-0.14, &lt;0.01</td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>0.07, 0.07</td>
<td>-0.12, &lt;0.01</td>
<td>-0.08, 0.08</td>
</tr>
</tbody>
</table>

- Can we foster a healthy eating identity as part of the Soldier identity?
  - Army Strong
  - Soldier athlete initiative
- Basic Training is a highly formative period
- Transition from civilian to Soldier
- Drill Sergeants are highly influential on new Soldiers

*Blake, et al. Appetite, 2013; **Jayne et al. Military Medicine, 2018
Drill Sergeants as Key Influencers

- Drill Sergeants (DS) are instrumental in turning civilians into Soldiers
- Qualitative study (N=30) on how DS view their role in the nutrition behaviors of Soldiers
- Key Results:
  - DS described their main duty as training new Soldiers
  - DS identified the ideal Soldier as lean and physically fit but did not identify training Soldiers how to eat to become the ideal Soldier as part of their duties
  - DS recognized that what Soldiers eat affects their physical performance and appearance
  - Did not see helping Soldiers establish healthy eating behaviors as their responsibility during basic combat training
  - Confusion about nutrition concepts was common

Jayne et al. JAND, 2018

Way Forward

- Changes to weight assessment frequency may be beneficial
- Tracking of stressors may proactively identify Soldiers who need interventions
- Nutrition education programs needs to incorporate mindfulness and building beneficial psychosocial determinants of food choice
- More specific nutrition guidance may be better
- Changes to initial training to emphasize role of nutrition in short and long-term physical and performance outcomes
- Need to instill healthy eating behaviors as a part of the Soldier identity
- Changes to the eating environment need to be driven by policy

Conclusions/Questions

- The Army has come a long way
  - Feeding approaches
  - Education/Health Promotion Strategies
- Still work to do

Thank you

Adrienne Hatch, MS, RD, CSSD
Adrienne.m.hatch.civ@mail.mil

MAJ Julianna Jayne, PhD, RDN, CHES
Julianna.m.jayne.mil@mail.mil