The Basis of Current DoD Body Fat Standards

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DoD Directive 1308.1, June 30, 2004
DoD Physical Fitness and Body Fat Program

It is DoD policy that:

4.1. Service members shall maintain physical readiness through appropriate nutrition, health, and fitness habits. Aerobic capacity, muscular strength, muscular endurance, and desirable body fat composition, form the basis for the DoD Physical Fitness and Body Fat Program.

1980 Review of Fitness in the Services produced the Directive specifying that all services follow the USMC lead with enforceable circumference-based body fat standards.
Body fat limits key to different outcomes

**Military Appearance**

Previous Marine Corps Standards
- <18% BF (men)
- <26% BF (women)

Healthy Active Young Recruits
- 15-20% BF (men)
- 25-30% BF (women)

NHLBI Guideline Equivalents
- <~26% BF (men)
- <~38% BF (women)

**Combat Readiness**

**Health**

Hodgdon, Fitzgerald & Vogel, 1990
Friedl, 2004
Patton, Daniels & Vogel, 1980
Harman & Frykman, 1992
Bathalon et al., 2006
Bathalon et al. 2006
Friedl, 2009
Body fat equations are focused on the key site reflecting chronic underexercise & overnutrition habits: abdominal and gluteal girths
Friedl, 2017

- Fit young male: 33" waist; 15" neck = ~15% body fat
- Upper limit (health): 40" waist; 17" neck = ~26% body fat

Graph showing stature and Abd2C-Neck C measurements.
Regional differences in fat cell activity

Rognum, Rodahl & Opstad, 1982

Fat cell biopsies before and after a week of intensive Norwegian Ranger training with complete food deprivation

Abdominal and gluteal fat are labile fat energy stores that can be modified by exercise and diet
Sex differences in intra abdominal fat deposition

Kvist et al. 1988

Unlike men, the intra abdominal space in women is protected against the first 30 kg of fat

FIG 1. Anthropometric measurements obtained from CT registrations: midsagittal transverse diameter \( (d_1) \); sagittal diameter \( (d_2) \); lateral subcutaneous AT thicknesses \( (a_1, a_2) \); dorsal and ventral subcutaneous AT thicknesses \( (a_3, a_4) \); visceral midsagittal transverse diameter \( (d_3 = d_1 - [a_1 + a_2]) \); visceral sagittal diameter \( (d_4 = d_2 - [a_3 + a_4]) \).

Gold standard measurement would be abdominal (and hip) CT
Army Body Fat Standards

Ideal = Distribution of % Body Fat in Healthy, Fit Young Men and Women

BMI = 25
WC ~35”

BMI = 27.5
WC ~40”

(Increased Health Risks)

Age-Specific Body Fat Limits

Women

Men

“Ideal”

“Overfat”

0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%

26%

36%
DoD Body Fat Standards

Women

- 18-26% body fat
- 26-36% body fat

Men

- 18-26% body fat
- 26-36% body fat

Range of DoD Body Fat Limits

“Overfat” (Increased Health Risks)
What kind of performance is important?
Physical performance is affected by added relative fat weight - but adiposity is not a good predictor of physical performance.

20% body fat limit for young men was based, in part, on correspondence to aerobic fitness.

Vogel and Friedl, 1992
Concept: Link Fitness and Body Fat Standards

Leu & Friedl, 2002
CMNR, IOM rpt, 1995

31.5% of all male soldiers exceed proposed weight tables

11% of all male soldiers also exceed fat standards

2.6% of all male soldiers exceeded fat standards but were under 26% body fat and scored better than 270 on the APFT (24% of male soldiers exceeding fat standards)
Effects of advances in nutrition and healthcare

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<th>Year</th>
<th>Age (y)</th>
<th>Ht (in)</th>
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<th>BF(%)</th>
<th>FFM (lb)</th>
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</table>

Muscle mass has increased by +30 lbs lean mass.
Abdominal circumference increases with age

(National data for males 1999-2000 is higher and does not level off)

2” increase in waist circumference in the Nintendo generation

Friedl, 2004
The method is the standard, with a focus on abdominal fat, not total body fat

Data from a sample of senior male NCOs at USASMA
Weight Control Program Metrics and Interventions

Military Services Fitness Database: Development of a Computerized Physical Fitness and Weight Management Database for the U.S. Army

Donald A. Williamson, PhD; COL Gaston P. Balthalon, SP USA; LTC Lorri D. Sigrist, SP USA; H. Raymond Allen, PhD; COL Karl E. Friedl, MS, USA; Andrew J. Young, PhD; Corby K. Martin, PhD; Tiffany M. Stewart, PhD; MAJ Lolita Burrell, MS, USA; Hongmei Han, M. Ap. Stat.; RADM Van S. Hubbard, PHS; Donna Ryan, MD

ABSTRACT The Department of Defense (DoD) has mandated development of a system to collect and manage data on the weight, percent body fat (PBF), and fitness of all military personnel. This project aimed to (1) develop...

Fort Bragg base pilot study, 2003

Efficacy of a Pilot Internet-Based Weight Management Program (I.E.A.L.T.I.I.) and Longitudinal Physical Fitness Data in Army Reserve Soldiers

Robert L. Newton Jr, PhD; Hongmei Han, MA App Stat; Tiffany M. Stewart, PhD; Donna H. Ryan, PhD; and Donald A. Williamson, PhD

94th RRC Army Reserve study, 2007

Development of an Internet/Population-Based Weight Management Program for the U.S. Army

Tiffany Stewart, PhD; Sandra May, M.S., LDN, RD; H. Raymond Allen, PhD; Col. Gaston P. Balthalon, SP, U.S. Army; Guy Lavengne, BS; Lorri Sigrist, PhD, RD; Donna Ryan, M.D.; and Donald A. Williamson, PhD

Louisiana National Guard RCT internet intervention

HEALTH (Healthy Eating, Activity, Lifestyle Training Headquarters) internet/mobile weight management program for the U.S. Army: Outcomes and future directions

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Introduction: A significant number of Soldiers exceed the maximum allowable weight standards, or have body weight approaching the maximum allowable weight standards, as defined by AR 600-9. The Army Body Composition Program In addition over the last two decades, Soldiers and members of military families have struggled with maintaining healthy weight, and sustaining healthy habits related to nutrition, fitness, and sleep. The present study tested the impact and broad dissemination of an anonymous internet and smartphone based program (HEALTH; Healthy Eating, Activity, Lifestyle Training Headquarters) designed to address health habits and weight gain in Soldiers.

Methods: Five thousand eight hundred National Guard Soldiers from fourteen units were randomly assigned to an immediate intervention or delayed intervention group for the first 30 months followed by two years of intervention available for all Soldiers.
DoD body composition standards ensure readiness to perform the mission at any time.