

# A Longitudinal Analysis of Cigarette Prices in Military Retail Outlets

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A large scientific literature amassed over the past 2 decades documents the significant, negative impact of tobacco use on nearly every aspect of military service in the United States. The military spends approximately \$1.6 billion a year on tobacco-related health care and lost productivity.<sup>1</sup> In just the Air Force, smoking results in more than 893 128 lost workdays per year, or more than the total active-duty full-time equivalents at 40% of Air Force installations.<sup>2</sup>

Tobacco use is more strongly related to combat readiness than are health issues that receive much more attention from military leadership, such as body composition.<sup>3</sup> Military personnel who smoke have significantly lower levels of physical fitness, less muscle endurance, poorer night vision, and less mental sharpness than their nonsmoking colleagues, and they are more likely to be injured.<sup>4-8</sup>

Tobacco use also harms the well-being and mental health of military members.<sup>3,9-11</sup> Smokers in the military report experiencing significantly greater work and life stress than their nonsmoking peers, likely because of chronic nicotine withdrawal.<sup>12</sup> Tobacco use is associated with increased prevalence and severity of psychosocial problems that result from exposure to combat. For instance, nicotine dependence doubles the risk of posttraumatic stress disorder in deployed troops,<sup>13</sup> and a strong dose-response relationship ( $P < .001$ ) has been demonstrated between the number of cigarettes smoked and suicide among active-duty army soldiers.<sup>10</sup> Clearly, the negative impact of tobacco on health and readiness is substantial.

In response to evidence that tobacco use is detrimental to the military, the Department of Defense (DoD) and the 4 armed services have instituted many tobacco control initiatives designed to discourage consumption. Military personnel have access to evidence-based behavioral and pharmacological treatments free of charge.<sup>1</sup> Free smoking cessation medications

**Objectives.** We conducted a longitudinal assessment of tobacco pricing in military retail outlets, including trends within each service branch.

**Methods.** We determined the price of a single pack of Marlboro Red cigarettes at military retail stores located in the continental United States, Alaska, and Hawaii and at their nearest Walmarts in spring 2011 and 2013 ( $n = 128$  for pairs available at both assessments).

**Results.** The average difference between cigarettes sold in military retail outlets and Walmarts decreased from 24.5% in 2011 to 12.5% in 2013. The decrease was partially attributable to significant price decreases at Walmarts. The largest increases in cigarette prices occurred on naval installations. Potential savings at stores on several installations remained substantial in 2013; the largest approached \$6 per pack. Stores on 17 military installations decreased cigarette prices during the study period.

**Conclusions.** Tobacco can be purchased in military retail stores at substantial savings over civilian stores. If tobacco pricing is to cease to be an incentive for use among personnel, a revised military tobacco pricing policy is needed. (*Am J Public Health*. 2014;104:e82-e87. doi:10.2105/AJPH.2013.301660)

are available through the TRICARE mail order program, which also provides around-the-clock access to pharmacists who are trained to assist with treatment.<sup>14</sup> Personnel also have access 24 hours a day, 7 days a week to a dedicated telephone counseling program with the TRICARE Smoking Quitline and Web-based treatment through a military live chat service. The military supports a social marketing program entitled Quit Tobacco, Make Everyone Proud.<sup>15</sup> In addition, the military has implemented many health policies designed to reduce the sale, distribution, and use of tobacco.<sup>16</sup> DoD Instruction 1330.09<sup>17(p3)</sup> states that to “communicate to Service members that tobacco use is detrimental to health and readiness,” tobacco must be priced within 5% of the lowest competitive price in the community. Despite the military’s arguably impressive tobacco control program, nearly one fourth of all military personnel continue to smoke.<sup>18</sup>

The continued high prevalence of smoking among troops has led researchers to attempt to identify factors that sustain a culture of tobacco in the military. A key component of this

culture is the perception by personnel that the military provides cheap and easily accessible tobacco in its military retail stores.<sup>19,20</sup> In fact, formative work among junior enlisted personnel, military health policy leaders, and installation tobacco control managers suggests that the perception of cheap tobacco on military installations is among the most significant barriers to tobacco control in the DoD.<sup>21</sup> In 2011 we investigated the veracity of this perception by comparing the price of tobacco at military retail outlets ( $n = 145$ ) with a standardized local community retailer (the nearest Walmart).<sup>22,23</sup> On average, we found that the military sold cigarettes at a 25.4% savings, with the difference as much as 73% at one Navy store.<sup>22</sup> Furthermore, we found that the prices at only 4.9% of military retail outlets were within 5% of prices at the community comparison, as required by military policy.

We reexamined the cost of cigarettes on military installations 2 years after our original study, which for the first time clearly documented that the DoD sells tobacco at prices much lower than civilian discount stores. Our objective was to amass the first longitudinal

data on tobacco pricing in military retail outlets, including trends within each service. In light of the military's interest in decreasing tobacco consumption among troops, it is important to document whether tobacco prices continue to be much lower than in the civilian market or if they are approaching civilian prices. We do not know whether publicity connected with our original research, as well as an investigative report on tobacco prices in military retail that aired on National Public Radio,<sup>24</sup> may have prompted military retail management to reconsider tobacco pricing. Finally, new military policies regulating tobacco have been approved since our original research,<sup>22,23</sup> the most relevant of which is a memorandum issued by Secretary of the Navy Ray Mabus eliminating any savings on tobacco products sold in Navy exchanges.<sup>25</sup> Thus, our new data are critical for evaluating the status of this important topic in military tobacco control research.

## METHODS

We tracked cigarette prices in military retail stores and their nearest Walmarts for 2 years, from spring 2011 to spring 2013. We used identical research methods at each assessment period. Data from the 2011 survey and detailed study procedures are available elsewhere.<sup>22,23</sup> Here we report data on cigarette price changes across the study and on prices in 2013.

We collected pricing data for a single hard pack of Marlboro Red cigarettes at both military exchanges and the nearest Walmarts. We chose Marlboro Red as the index brand because it accounts for approximately 44% of the domestic cigarette market, outsells the next 11 cigarette brands combined, and traditionally has been heavily marketed to the military.<sup>26</sup> We conducted telephone interviews with each military exchange and Walmart to determine prices. A trained research assistant contacted each store and asked to speak with the salesperson at the tobacco counter or register to ensure collection of accurate current price data. DoD Instruction 1330.09<sup>17</sup> requires community price comparisons to be based on local retail shelf price, including all federal and state excise taxes, as is noted by public statements from officials from the Army and Air Force Exchange Service and Navy Exchange<sup>27</sup> and expert panels.<sup>2</sup> The only tax that should affect

cost differences between military retail outlets and Walmarts are state and local sales taxes.<sup>26</sup> Consistent with our previous reports,<sup>22,23,28</sup> we based cost comparisons on the purchase price (including all taxes) of cigarettes, because differences stemming from sales tax are likely an incentive for purchase from military retail. When calling each Walmart, the researcher asked whether the price included tax. If the price did not include tax, the researcher asked for the tax rate and calculated the final purchase price.

## Sampling Procedures

**Military exchanges.** In the 2011 assessment of cigarette pricing on military exchanges,<sup>22</sup> we obtained contact information for all Army, Air Force, Navy, and Marine exchanges (n = 202) in all 50 states through their official Web sites. We called each installation exchange at least 3 times at different times of day to gather the information. If the phone was not answered or information was not available after the 3 calls, we coded the exchange as nonresponsive. Baseline (2011) results can be found in Jahnke et al.<sup>22</sup> We used identical procedures for the follow-up assessment. Of the 202 exchanges contacted in the follow-up assessment, 7 had closed since 2011, and 2 did not sell cigarettes. At 9 exchanges, personnel refused to provide the requested information because of store policy about price quoting over the phone. Thus, we obtained data for a total of 184 military exchanges (91.1% of the original 2011 sample).

**Community price comparison.** To obtain a consistent price comparison across all exchanges in the United States, we used Walmart as the comparison store. This comparison was recommended by our military advisors prior to the 2011 study and approved by scientists who reviewed the project proposal. Selecting Walmart as the local community comparison outlet had 4 main advantages. First, Walmart provides a consistent comparison across military installations. Second, Walmart's reputation for competitive prices is well publicized. Third, the store finder on the Walmart Web site made locating stores simple. Fourth, Walmart was used as a comparison for pricing in military exchanges in congressional testimony and our previously published studies.<sup>22,23,28</sup>

Although it is possible that lower tobacco prices than those at Walmart could be available in a local community, it was not feasible to

conduct a market analysis in all of the communities surrounding every military installation to determine the absolute lowest price available. Furthermore, DoD Instruction 1330.09 does not define local community or what constitutes a legitimate comparison store.<sup>28</sup> In fact, previous reports suggest that no consistent methodology is used by military retail outlets to determine the most competitive commercial price of tobacco products.<sup>24,28</sup> Thus, Walmart provided an appropriate and methodologically attractive comparison with military retail stores for tobacco prices.

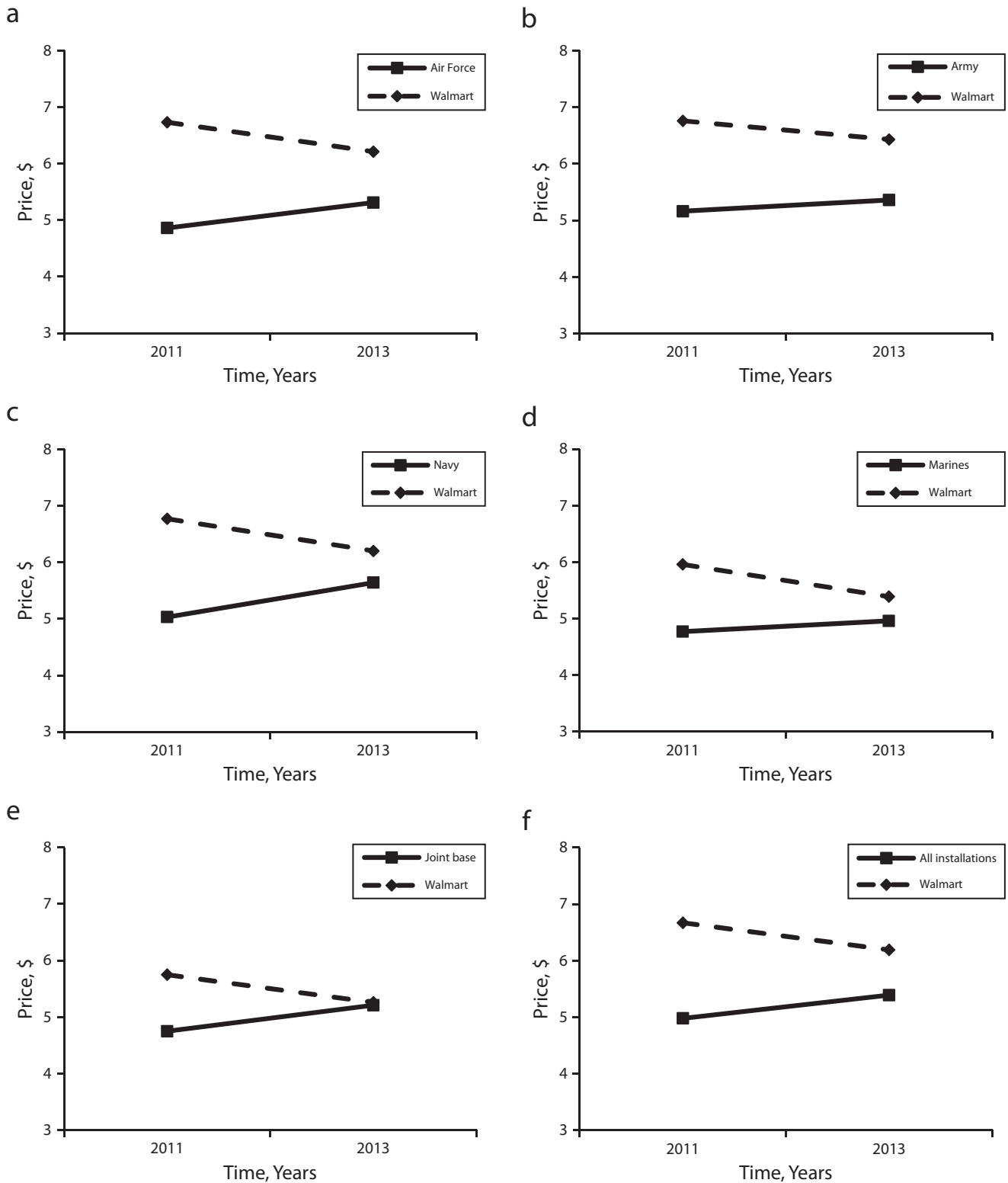
For consistency, we used the same Walmarts that served as comparisons in the 2011 assessment in the follow-up, even if a new store had opened and was closer to the exchange. In 7 cases, a single Walmart was the closest store to multiple exchanges. We used identical procedures to assess the cost of a hard pack of Marlboro Red at Walmarts and military exchanges. We contacted 13 Walmarts 3 times with no answer, 2 did not sell tobacco, 1 store had closed since 2011, and 1 military installation had no Walmart within a 50-mile radius; our final follow-up total was 185 (91.6%) Walmarts from the 2011 assessment. All Walmarts contacted provided information during the follow-up assessment. The follow-up assessment comprised 172 exchange–Walmart paired comparisons (i.e., where both an exchange and its closest Walmart provided pricing data). We excluded 2 comparisons involving Air National Guard installations, leaving 170 paired comparisons for follow-up analyses. We were able to obtain complete pricing data (i.e., both military retail and Walmart stores in both 2011 and 2013) for 128 installations, and we used these installations for the longitudinal analyses.

## Statistical Analysis

We calculated price comparisons between military exchanges and Walmarts with the following equation:

$$(1) \text{ Savings} = \left( \frac{\text{Walmart Price} - \text{Exchange Price}}{\text{Walmart Price}} \right) \times 100$$

Thus, savings refers to the percentage cost reduction a service member would realize by purchasing cigarettes at military exchanges



Note. The sample sizes for comparisons were as follows: Air Force (n = 43), Army (n = 37), Navy (n = 36), Marines (n = 9), joint base (n = 3), and total (n = 128).

**FIGURE 1—Change in cigarette prices in Walmart stores and in military installations for (a) Air Force, (b) Army, (c) Navy, (d) Marines, (e) joint base, and (f) all installations: United States, 2011–2013.**

**TABLE 1—Military Installations Where Retail Exchanges Lowered per-Pack Cigarette Prices: United States, 2011–2013**

Installation (State)	Service	Military Exchange Price, \$		Nearest Walmart Price, \$	
		2011	2013	2011	2013
Fort Sam Houston (TX)	Army	5.65	4.80	7.25	6.34
Fort Polk (LA)	Army	5.05	4.60	6.00	6.38
Bellows (HI)	Air Force	7.70	7.29	7.28	8.17
Fort Shafter (HI)	Army	7.70	7.29	7.28	8.17
Schofield Barracks (HI)	Army	7.70	7.29	7.73	8.17
Maui Exchange (HI)	Army	7.70	7.29	7.73	8.13
Lemoore (CA)	Navy	5.10	4.69	6.21	5.65
FE Warren (WY)	Air Force	4.30	3.95	5.73	5.30
Fort Belvoir (VA)	Army	4.40	4.10	6.19	5.33
Altus (OK)	Air Force	5.25	5.00	6.94	5.38
Anacostia Bolling (DC)	Joint base	6.50	6.25	5.67	5.26
Fort Leonard Wood (MO)	Army	4.60	4.40	5.22	4.86
Camp Lejeune (NC)	Marines	4.98	4.79	5.69	5.28
Beale (CA)	Air Force	5.10	5.00	6.21	5.62
Fort Huachuca (AZ)	Army	5.85	5.75	7.84	7.16
Fort Irwin (CA)	Army	5.10	5.00	6.24	5.65
Patuxent River (MD)	Navy	6.00	5.95	8.08	6.68

rather than at Walmart. We conducted all analyses with SAS version 9.3 (SAS Institute Inc, Cary, NC).

**RESULTS**

Figure 1 presents the change in cigarette prices, both on military installations and in the Walmart comparison stores, across time. Regardless of service, cigarette prices increased on military installations and decreased at Walmart across the study period. Overall, prices on military installations increased by an average of 44 cents (SD = 0.49) per pack. We

observed significant differences among the services on the magnitude of price changes ( $F = 5.61$ ;  $P < .001$ ). Post hoc tests found that the price increase on Navy installations (mean = 0.66; SD = 0.58) was significantly larger than that for Army installations (mean = 0.20; SD = 0.41;  $P < .001$ ).

Table 1 lists military installations that lowered cigarette prices during the study period, along with the change in prices for the respective Walmarts. A total of 17 installations decreased cigarette prices across the study period, ranging from 5- to 85-cent reductions. In 5 cases, an installation decreased

and the nearest Walmart increased cigarette prices.

Table 2 presents price comparisons for military exchanges in 2013. On average, cigarettes prices were nearly 13% lower in military exchanges than in the nearest Walmarts. We found significant differences among the services on the magnitude of savings for cigarettes ( $F = 5.39$ ;  $P < .001$ ). Post hoc tests revealed that the savings found at exchanges on Army installations (mean = 1.19; SD = 1.04) were significantly larger than those found on Marine (mean = 0.48; SD = 0.26;  $P = .034$ ) and Navy (mean = 0.55; SD = 0.64;  $P = .005$ ) installations. However, we found no significant differences among the services for the actual price of cigarettes. Only 4.6% of exchanges had cigarette prices within 5% of Walmart prices.

Table 3 presents the top 10 installations with the largest price savings. Cigarettes on these installations cost much less than those at the nearest Walmarts, with the top savings approaching \$6 per pack. Exchanges with the largest savings on cigarettes were primarily on Air Force and Army installations and were located in states with both very low (Alabama) and high (New York) cigarette excise tax rates.<sup>29</sup>

**DISCUSSION**

Over the course of our 2-year study, military retail outlets increased the price of a pack of Marlboro Red cigarettes by a modest 44 cents. Although prices increased at exchanges for every service, the Navy had the largest increase. It is important to note that the Navy was the only service to issue guidance during the course of the study specifically designed to

**TABLE 2—Military Retail Exchange and Walmart per-Pack Prices for Marlboro Red Cigarettes: United States, 2013**

Variable	Exchange Price, Mean ±SD (range)	Nearest Walmart Price, Mean ±SD (range)	Difference, <sup>a</sup> Mean ±SD	Savings (Range)
Air Force (n = 54), \$ or %	5.41 ±0.82 (3.95-8.50)	6.36 ±1.09 (5.06-10.05)	0.94 ±0.64	14.2 (-0.07-3.36)
Army (n = 45), \$ or %	5.43 ±1.01 (4.10-8.15)	6.62 ±1.56 (4.69-11.73)	1.19 ±1.04	16.7 (-0.32-5.93)
Navy (n = 53), \$ or %	5.68 ±1.06 (4.49-9.05)	6.23 ±1.13 (4.69-9.96)	0.55 ±0.64	8.4 (-1.65-2.61)
Marines (n = 12), \$ or %	4.94 ±0.21 (4.54-5.20)	5.42 ±0.24 (4.95-5.73)	0.48 ±0.26	8.7 (-0.25-0.73)
Joint Base (n = 6), \$ or %	5.99 ±1.17 (4.40-7.40)	6.62 ±1.67 (5.26-9.00)	0.63 ±0.95	10.5 (-0.99-1.90)
All Installations (n = 170), \$ or %	5.49 ±0.95 (3.95-9.05)	6.33 ±1.25 (4.69-11.73)	0.84 ±0.80	12.5 (-1.65-5.93)

<sup>a</sup>Scores represent the remainder of subtracting the Walmart price from the military retail price for each pair and calculating the distribution of the differences. Negative scores indicate that Walmart prices were higher than military retail prices.

**TABLE 3—Top 10 Largest Savings per Cigarette Pack in Military Retail Exchanges Over Walmarts: United States, 2013**

Installation (State)	Service	Military Exchange Price, \$	Nearest Walmart Price, \$	Difference, \$
West Point Military Academy (NY)	Army	5.80	11.73	-5.93
Rock Island Arsenal (IL)	Army	4.80	8.29	-3.49
Fort Drum (NY)	Army	8.15	11.54	-3.39
Hanscom Air Force Base (MA)	Air Force	5.80	9.16	-3.36
Fort Hamilton (NY)	Army	7.55	10.16	-2.61
Naval Weapons Station Earle (NJ)	Navy	7.35	9.96	-2.61
Scott Air Force Base (IL)	Air Force	5.95	8.29	-2.34
Goodfellow Air Force Base (TX)	Air Force	5.65	7.75	-2.10
Maxwell-Gunter Air Force Base (AL)	Air Force	4.40	6.47	-2.07
Fairchild Air Force Base (WA)	Air Force	6.25	8.23	-1.98

Note. Prices are for 1 pack of Marlboro Red cigarettes.

discourage tobacco pricing that encourages consumption.<sup>25</sup> In light of the substantial negative impact of tobacco use on military health and readiness, it is surprising that prices at several military retail outlets actually decreased during the study, sometimes substantially. For instance, cigarette prices at Fort Sam Houston in Texas declined by 15%.

In 2013, the average price of cigarettes at military retail stores was approximately 12.5% lower than at the closest Walmarts. This represents a considerable decrease from the 24.5% average savings found in 2011.<sup>22</sup> In our comparison of exchange–Walmart pairs that were available for both baseline and follow-up (n = 128), the price differentials at the 2 time points were similar to those for all available comparisons at either assessment (2011, 24.8%; 2013, 12.3%). Although this result is at least somewhat encouraging, it is tempered by the fact that much of the decline in the savings was attributable to decreased cigarette prices at Walmarts from 2011 to 2013. Several recent media reports documented Walmart's plan to reduce prices of consumer goods during the study period.<sup>30,31</sup> Our research documents Walmart's price reduction on cigarettes; however, even combined with the modest increase in prices at military retail outlets, the savings realized by purchasing cigarettes on military installations remained substantial. Also, our findings documented that the savings on cigarettes found on many military installations were surprisingly large: as

much as \$5.93 between the West Point Military Academy and the nearest Walmart.

According to the DoD Instruction regulating tobacco pricing, the cost of cigarettes at military retail stores should “communicate to service members that tobacco use is detrimental to health and readiness.”<sup>17(p3)</sup> Military exchanges that decrease the price of cigarettes over time or set prices substantially lower than a retailer known for low prices on consumer goods such as Walmart actively encourage tobacco consumption by our nation's troops. Although prices increased modestly at exchanges across the study period, they remained relatively low compared with a civilian discount chain. If prices at military retail stores were being used to communicate that tobacco is detrimental, at minimum they would be higher—not significantly lower—than those found at major discount chains.<sup>28</sup>

Along with previous studies of tobacco pricing,<sup>22,23</sup> our results reveal an unsystematic mix of pricing practices across military retail outlets, with many stores selling cigarettes at prices much lower than Walmart's and only a few selling tobacco at prices similar to the local civilian market. This contradicts stated policy and contributes to the harmful impact of tobacco on the military. The DoD has many options to improve tobacco pricing practices. First, we found no evidence of systematic monitoring of tobacco prices in military retail outlets from outside the exchange system or of any penalty for violations of DoD Instruction

1330.09. Further, we are aware of no published reports on how exchanges actually set tobacco prices. Previously we suggested that the DoD should require military retail outlets to present pricing plans to outside inspection by military health promotion personnel on the installation.<sup>28</sup> Making the process of tobacco pricing transparent to military health policy leaders would likely discourage the sale of discounted tobacco.

Second, the DoD could adopt a minimum tobacco price policy, as exists in 24 states and the District of Columbia.<sup>32</sup> To effectively discourage use, this price would be sufficiently high to communicate that tobacco use is harmful to military readiness. Finally, to be an effective partner in the military's tobacco control program, military retail outlets should go beyond simply controlling prices and follow the example of stores in Veterans Affairs facilities, which phased out tobacco sales entirely.<sup>26</sup> Eliminating the sale and marketing of tobacco on all military installations would be a critical component of efforts to create a tobacco-free US military force.<sup>1</sup> ■

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### Contributors

C. K. Haddock was the principal investigator and primary author of the article. M. L. Hyder collected all data and helped write the article. W. S. C. Poston, S. A. Jahnke, L. N. Williams, and H. Lando helped design the study and methodology and reviewed the article.

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### Human Participant Protection

All study procedures were approved by the institutional review board of National Development Research Institutes Inc.

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