

Persistent differences in tobacco product pricing on U.S. Air Force Bases as compared to surrounding community areas, 2019

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ABSTRACT

Introduction: In March 2017, the Department of Defense (DoD) issued a policy requiring all military stores to set tobacco prices equal to “prevailing prices” in the “local community” adjusted for state and local taxes. We compared tobacco product prices in a sample of retailers located on five Air Force Bases (AFB) in Texas and Mississippi to those sold in nearby off-base stores.

Methods: We constructed a list of on- and off-base tobacco retailers. Off-base retailers included stores that were located within a 1.5-mile road network service area from main AFB gates. Between July and September 2019, a trained auditor visited 23 on- and 50 off-base retailers to confirm tobacco product sales, and documented the price of cigarette products and Copenhagen smokeless tobacco. For each area, the median price for each product, as well as the difference in median prices by on- vs. off-base status was calculated.

Results: The median price of cigarette and smokeless products was cheaper at on-base retailers. All products were cheaper at on-base stores in Fort Sam Houston and Lackland AFB. Similarly, all products were cheaper in on-base stores at Keesler AFB, with the exception of Marlboro Red packs (\$0.22 more), and at Sheppard AFB with the exception of cheapest cigarette carton (\$6.26 more).

Conclusion: Despite the implementation of the new DoD policy, tobacco products are cheaper in on-base retailers compared to off-base retailers. Refining of the definitions used and compliance with the new DoD policy is needed.

What this paper adds

- The prevalence of current tobacco use among U.S. active duty military personnel is much higher than among civilian populations.
- Tobacco products are sold at lower prices in tobacco retailers located on military bases as compared to those located off military bases, contributing to the higher prevalence of use among military personnel.
- On March 30, 2017, a reformed Department of Defense (DoD) policy was implemented that required all military stores to set all tobacco prices equal to “prevailing prices” in the “local community” adjusted for state and local taxes.
- It is not yet known whether tobacco product prices are still cheaper on military bases.
- Results demonstrate that tobacco products remain less expensive in a sample of retailers on Air Force Bases as compared to retailers in proximate community areas, despite the implementation of the reformed policy.
- Continued refining of the definitions used and compliance with, the new DoD policy is needed to prevent and reduce tobacco use and associated health costs among military personnel.

Keywords: Priority/special populations; Advertising and Promotion; Environment

INTRODUCTION

The United States (U.S.) Department of Defense (DoD) is the largest global employer, employing both active duty service members and civilian personnel.¹ The prevalence of current tobacco use among active duty military personnel is much higher than among civilian populations.^{2,3} As a result, the DoD spends over \$1.6 billion annually on tobacco related medical care, increased hospitalization and lost work days.⁴ In the most recent (2011) DoD Health Related Behavior Survey, it was estimated that 24.5% of military personnel smoked cigarettes and 12.8% used smokeless tobacco.⁵ It is estimated that the Air Force loses over 893,128 work days per year due to tobacco use.⁶ Additionally, tobacco use also affects military readiness including reduced physical fitness,^{7,8} increased training injuries^{9,10} and premature discharge. These together result in over \$130 million in excess training costs.¹¹

Increasing the price of tobacco products is one of the most effective tobacco control strategies for reducing use.¹²⁻¹⁴ However, targeted marketing by the tobacco industry through price promotions and discounted tobacco products on base have likely contributed to the high rates of tobacco use among this priority population.¹⁵⁻²⁰ In addition, previous studies have found that junior enlisted military personnel perceive that the military supports tobacco use by providing greatly reduced tobacco prices in stores on base.²¹⁻²⁴ In 2005, the DoD issued Instruction 1330.09, which required retailers on military installations to set tobacco product prices to be no cheaper than 5% lower than the most competitive price in the local community.²⁵

Several factors prevented the 2005 policy from having substantial impacts on reducing tobacco use.²⁶ First, military retailers were allowed to search for the most discounted price in their community and still set the price 5% lower. Additionally, by explicitly stating that the price could be no higher than the lowest community price ensured that military tobacco prices could remain cheaper on military bases. The final tobacco product price paid by consumers also did not account for local and state excise taxes, which are not charged at military retailers but can account for an average of 43.8% of the average price off-base across the U.S.²⁷ Finally, the policy failed to establish regulatory oversight for the policy.

Indeed after the implementation of this DoD policy, phone surveys of tobacco retailers indicated that cigarette prices were 12.5% to 24.5% cheaper on military bases compared to the most proximal Walmart store.^{23,28,29} In 2016, we visited on- and off-base DoD stores at Air Force Technical Training bases in Texas and Mississippi and collected data on the prices of cigarettes and other tobacco products.³⁰ We found that Marlboro Red and Newport Menthol packs were between \$0.80–0.87 cheaper on-base, which amounted to a \$292–318 annual savings for an individual that smokes a pack a day. Additionally, a tin of Copenhagen smokeless tobacco was \$0.65 cheaper at on-base retailers.

In April 2016, the Secretary of Defense issued one of the most comprehensive tobacco policy reforms in DoD history.³¹ This policy, which was fully executed as of March 30, 2017, required all DoD stores to set all tobacco prices *equal* to “prevailing prices,” in the “local community” adjusted for state and local taxes. Building on our previous work,³⁰ we audited tobacco prices on and near Air Force Technical Training bases in 2019 to assess whether prices of cigarette and smokeless products sold in retailers on Air Force Bases were similarly priced to those being sold in off-base proximate retailers after the implementation of the new DoD policy.

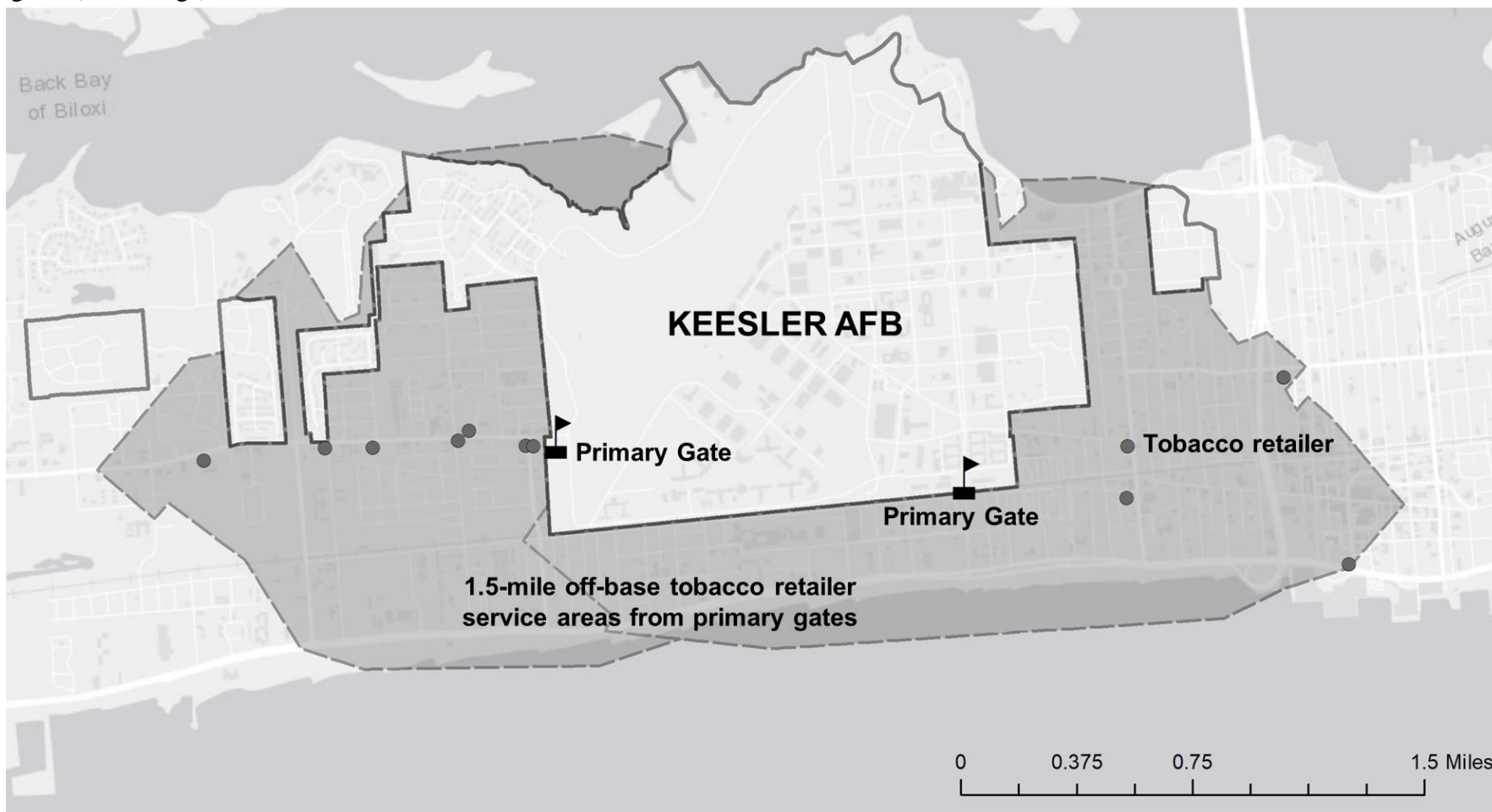
METHODS

Study Area

Tobacco product, price and promotion data was collected from on-base and proximate off-

base tobacco retailers at five Air Force Technical Training bases in Texas (Fort [Ft.] Sam Houston, Lackland Air Force Base, Sheppard Air Force Base, and Goodfellow Air Force Base) and Mississippi (Keesler Air Force Base). To better approximate those off-base retailers where Airmen would be most likely to purchase tobacco, we included those tobacco retailers that were located within a 1.5-mile (plausible walking distance) road network service area of the primary 24-hour base gates through which Airmen enter and leave each AFB. To construct this service area, staff at each AFB used the Google Maps mobile application to take GPS coordinates at each of the base's primary gates. We then used these GPS coordinates to map the point location of each gate. Using ESRI's Street Map Premium, a road network file, and the Network Analyst tool in ArcMap 10.5, we constructed 1.5-mile road network service areas from each gate (Figure 1).

Figure 1. Example of tobacco retailers (dark grey circles) located outside of Keesler Air Force Base [AFB] (solid black outline) and within a 1.5-mile road network service area (dashed line, shaded grey area) from two staff-identified 24-hour primary base gates (black flags).



Tobacco Retailer Data Sources

A census of on-base retailers was created using our previous 2016 work³⁰ and by consulting AFB websites and staff who worked on each base. We then employed several strategies to identify all off-base retailers within the 1.5-mile road network service areas. To construct an off-base retailer sampling frame for each base, we used our 2016 ground-truthed list in addition to two other data sources. First, the Texas Department of Revenue has a publicly available tobacco retailer licensing list, and we integrated this state-wide list into our sampling frame for the Texas bases. Second, we supplemented this list with RefUSA, a business establishment database that contains store names, addresses, locations of retailers, and business establishment type codes that have been used in previous work to identify tobacco retailers.^{32,33} Using this sampling frame, we mapped the location of each tobacco retailer and then included those that were located within each 1.5-mile road network service area.

A trained data collector visited each on- and off-base retailer. The data collector also ground-truthed each base area by visiting any retailers that they saw in the area but that might not have been on the preliminary sampling frames we created. The data collector verified that tobacco products were sold at each retailer visited. Finally, to confirm the geolocation of each retailer (on-base vs. within 1.5-mile road network service areas from each gate), the data collector took a GPS coordinate using the Google Maps mobile application at the front entrance of each retailer.

Outcome Measures

We visited identified off- and on-base retailers between July 2019 and September 2019 and collected tobacco product availability and product price information at each retailer using a preprogrammed electronic survey.

The data collector first indicated whether tobacco products were sold (yes/no). If tobacco products were sold, the data collector then indicated (yes/no) whether pack and cartons of cheapest cigarette product, Marlboro Red, Newport menthol, and Copenhagen smokeless tobacco were sold. Where sold, the data collector documented the advertised pack and carton price (in U.S. dollars and cents) of the cheapest cigarette product; Marlboro Red; Newport Menthol; and the advertised price of a single tin of Copenhagen smokeless tobacco. For all recorded prices, the data collector indicated whether sales tax was included in the advertised price.

Descriptive Data Analysis

The study data collector visited a total of 114 retailers. Primary eligibility criteria for the analytic sample included that the data collector could survey the store and the retailer sold tobacco products. We excluded 41 retailers for the following reasons: retailer did not exist (5); retailer was closed (6); retailer did not sell tobacco products (13); clerk refusal (2); duplicate entry or store (11); off-base retailer was not within 1.5-mile service area (4).

We used SAS 9.4 to calculate the recorded median price and range for tobacco products that were sold in on- and off-base retailers for each AFB. For all off-base reported prices where sales tax was *not* indicated by the data collector, we added the state sales tax amount (7.00% in Mississippi; 8.25% in Texas). Since on-base retailers are exempt from local and sales taxes, we did not add local or state taxes to reported prices. However, on-base commissaries, or retailers that sell household goods and groceries to military personnel, include an additional 5% surcharge on all products purchase, which we accounted for in analyses. We additionally calculated location-based differences in prices by subtracting the base-specific median off-base price from

the median on-base price. A negative difference indicates that the median price for a tobacco product was cheaper at retailers on-base as compared to those off-base.

RESULTS

A total of 73 tobacco retailers were eligible for analysis, including 50 off-base retailers and 23 on-base retailers across the analytic sample (Table 1).

Table 1. On- vs. Off- Air Force Base Tobacco Retailer Counts, 2019

Air Force Base	# of Primary Base Gates	^aNumber of Airmen	On-Base Retailer Count	^bOff-Base Retailer Count
Fort Sam Houston (TX)	3	1691	6	10
Goodfellow (TX)	1	1907	3	3
Keesler (MS)	2	4472	4	12
Lackland (TX)	2	6592	6	16
Sheppard (TX)	3	10367	4	9
Totals		25,029	23	50

^aIncludes the number of non-prior service enlisted technical training graduates in fiscal year 2019

^bOff-Base retailers include tobacco retailers within a 1.5-mile road network service area(s) of UVA-staff identified primary gate(s) of each Air Force Base.

Overwhelmingly, the median price of cigarette and smokeless products was cheaper at on-base retailers as compared to off-base retailers (Table 2). For example, as compared to nearby off-base stores, all tobacco products were cheaper at on-base stores in Ft. Sam Houston and Lackland AFB. Across all AFBs, on-base stores sold Newport menthol packs and cartons, Marlboro Red cartons, and Copenhagen at lower prices than off-base stores.

Table 2. Median Price Paid and Price Difference for Tobacco Products by On- vs. Off- Air Force Technical Training Bases, 2019 (\$USD)

	Fort Sam Houston			Goodfellow			Keesler			Lackland			Sheppard		
	n	Median	Range	n	Median	Range	n	Median	Range	n	Median	Range	n	Median	Range
Cheapest Cigarette Pack															
On-Base	5	4.60	4.60-5.10	2	4.80	4.80-4.80	3	3.90	3.90-3.90	5	4.55	4.48-4.60	2	5.55	5.45-5.65
Off-Base	7	5.67	4.64-5.89	3	4.32	4.32-4.49	9	4.46	2.95-5.31	13	5.29	4.32-6.27	7	5.62	4.32-6.08
<i>Difference</i>		-1.07			0.48			-0.56			-0.74			-0.07	
Marlboro Red Pack															
On-Base	5	6.90	6.90-6.90	2	6.80	6.70-6.90	3	6.20	6.20-6.20	5	6.87	6.75-6.90	2	7.10	7.10-7.10
Off-Base	7	7.60	7.17-7.82	3	7.04	7.04-7.60	9	5.98	5.45-6.56	14	7.37	6.22-7.82	7	7.17	7.00-7.60
<i>Difference</i>		-0.70			-0.24			0.22			-0.50			-0.07	
Newport Menthol Pack															
On-Base	5	6.78	6.28-6.78	2	6.93	6.93-6.93	3	6.05	6.05-6.05	5	6.28	6.01-6.78	2	7.34	7.34-7.34
Off-Base	7	7.77	7.18-8.35	3	7.83	7.29-7.90	8	6.23	6.09-7.09	11	7.85	6.48-8.65	7	7.36	7.18-8.18
<i>Difference</i>		-0.99			-0.90			-0.18			-1.57			-0.02	
Cheapest Cigarette Carton															
On-Base	6	49.15	47.05-49.15	3	45.75	43.57-46.75	4	37.78	37.50-46.75	6	48.29	46.00-49.50	3	57.30	56.80-63.62
Off-Base	2	58.62	58.46-58.78	1	43.19	43.19-43.19	8	48.85	32.09-58.51	6	54.17	45.36-62.68	4	51.04	42.11-56.18
<i>Difference</i>		-9.47			2.56			-11.07			-5.88			6.26	
Marlboro Red Carton															
On-Base	4	67.00	63.81-67.00	3	63.77	59.45-66.95	3	60.20	57.34-60.2	6	67.00	63.81-69.00	3	68.75	65.48-68.75
Off-Base	3	73.83	62.46-76.53	1	70.36	70.36-70.36	8	63.40	56.70-70.48	5	70.36	64.52-78.16	4	71.12	67.66-75.99
<i>Difference</i>		-6.83			-6.59			-3.20			-3.36			-2.37	
Newport Menthol Carton															
On-Base	6	65.60	62.48-65.60	2	65.42	63.69-67.15	4	58.40	55.62-58.40	5	65.60	62.48-65.60	3	70.70	70.70-72.20
Off-Base	3	77.72	75.78-78.48	1	78.26	78.26-78.26	6	67.25	64.37-72.43	5	75.02	64.84-78.48	4	76.50	72.53-80.74
<i>Difference</i>		-12.12			-12.84			-8.85			-9.42			-5.80	
Copenhagen Tin															
On-Base	6	5.80	5.55-6.53	2	5.91	5.77-6.05	3	3.2	3.20-3.20	6	5.61	5.30-6.05	3	5.75	5.25-5.75
Off-Base	4	6.21	5.78-7.13	2	6.57	6.43-6.70	7	5.35	3.54-5.99	7	5.75	5.29-6.81	6	6.08	4.54-6.60
<i>Difference</i>		-0.41			-0.66			-2.15			-0.14			-0.33	

Note: Off-base prices included local and sales tax while on-base prices from commissaries included a 5% surcharge. The difference is calculated by subtracting the median off-base price from the median on-base price. Those differences that are negative (shaded) indicate that the median price for a tobacco product was cheaper at retailers on-base as compared to those off-base.

Some on-base retailers reported higher median tobacco product prices as compared to off-base retailers, however. At Goodfellow AFB on-base stores, the median cheapest cigarette pack and carton prices were \$0.48 and \$2.56 more, respectively, as compared to those off-base. Additionally, Keelser AFB sold Marlboro Red packs for \$0.22 cents more on-base as compared to off-base, and on-base retailers on Shepard AFB sold cheapest cigarette cartons for \$6.26 lower as compared to off-base stores.

DISCUSSION

Overall, our study results demonstrate that tobacco products remain less expensive in retailers on AFB bases as compared to retailers in proximate community areas, despite the implementation of the reformed DoD policy which required all DoD stores to set all tobacco prices equal to prevailing local prices, adjusted for state and local taxes.³¹

To the best of our knowledge, this is the first study to assess price disparities after the implementation of the new DoD policy. The tobacco product price disparities we document are consistent with research conducted *prior* to the implementation of this policy that indicated cigarettes sold on-base were cheaper than those off-base.^{23,28-30} We also found that smokeless tobacco continues to be less expensive on-base compared to off-base retailers. Since pricing strongly impacts tobacco use,^{34,35} the persistent cheaper prices of tobacco products on-base may be contributing to higher rates of tobacco use among military personnel than in the civilian population.^{5,36}

Two factors that may influence compliance with the reformed DoD pricing policy are the clarity of policy language and the resulting feasibility of tracking off-base tobacco product prices. First, the policy defines the *local community* as “an area no greater than a 20-mile radius from the installation.”³¹ Other than specifying a maximum, the DoD policy gives no guidance on the ideal radius size, which may greatly affect the number of tobacco retailers and prices recorded for comparison. Different radius sizes may by chance or purposively result in prices that comply or do not comply with the policy. In the current study, we surveyed off-base retailers within a 1.5-mile road network service area of the main base gates after talking with base staff who believed this was within a reasonable walking distance of each base, and retailers within this area were therefore the ones where Airmen would be most likely to purchase tobacco (Airmen rarely have cars to travel farther). The DoD policy may want to consider requiring each base to have a tailored definition of *local community*³⁶ that better reflects how far military personnel are most likely to travel off each base. Furthermore, the current 20 mile maximum is quite large, and may prove difficult for identifying retailers and assessing and ensuring compliance with the policy.

Second, the DoD policy mandates that the off-base *prevailing price*, defined as, “the most common shelf price paid for a tobacco product by local consumers within the local community” match that of the prices at on-base retailers.³¹ The specification for the “most common” shelf price implies that tobacco products are regularly priced at the same cost. However, a mode price may not be calculable, even with multiple measures of prices. For example, a community with tobacco products priced similarly but have different exact prices (e.g., \$5.20, \$5.21, \$5.22) has no “most common” price. Furthermore, in a relatively small sample of stores in a given base’s area, a mode could be based on the same price at just two or three stores, and may not capture the central tendency of the prices. At Fort Sam Houston, the median price for a pack of Newport cigarettes was \$7.77 while the mode was \$7.38 (range: \$7.18-8.35). Employing another measure of central tendency, such as the mean or the median, might be easier to calculate and to evaluate

policy compliance.

A limitation of our study is that we audited tobacco retailers at just the five AFBs where Technical Training is held, and we had a small sample size and limited statistical power to be able to statistically test any associations. Our study results may therefore not be generalizable to other AFBs or military bases. A strength of our study, however, is that we were able to characterize the surrounding off-base retailer environment based on conversations with AFB staff. Since most Airmen (54.2%) initiate tobacco use or relapse during Technical Training,³⁷ it is important to understand the tobacco environment around AFBs that may be contributing to tobacco use behavior in the military. We were also able to demonstrate the feasibility of visiting tobacco retailers to record tobacco product prices without requiring clerk input or time.

Overall, tracking tobacco product pricing for both cigarettes and smokeless tobacco products on and near military bases is critical to ensure compliance with the strengthened 2017 DoD policy. Additionally, with the growing tobacco product landscape, additional research should begin tracking prices of other tobacco products commonly used by military personnel, such as e-cigarettes, which almost tripled in prevalence from 5.5% in 2013 to 15.3% in 2018.³⁸ Our study indicates that tobacco products are still being sold at much lower prices on AFB, which may contribute to high initiation and tobacco use rates among Airmen. Continued refining of the definitions used and compliance with, the new DoD policy is needed to potentially prevent and reduce tobacco use and associated health costs among military personnel.

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