



Healthy Volunteer 2020: Comparing Peace Corps Volunteers' health metrics with Healthy People 2020 national objectives[☆]

Susan J. Henderson ^{*}, Jeannette Newman, Rennie W. Ferguson, Paul Jung

Peace Corps Office of Health Services, United States

ARTICLE INFO

Article history:

Received 4 January 2016

Received in revised form 17 May 2016

Accepted 23 May 2016

Available online 24 May 2016

Keywords:

Healthy People 2020

US Peace Corps

Health indicators

Health metrics

ABSTRACT

Healthy People 2020 (HP2020) provides a set of quantifiable objectives for improving the health and well-being of Americans. This study examines Peace Corps Volunteers' health metrics in comparison with the Leading Health Indicators (LHIs) in order to set baseline measures for Volunteers' health care and align our measurements with Healthy People 2020 standards. Health data from multiple internal Peace Corps datasets were compared with relevant LHIs and analyzed using descriptive statistics. Seventeen (65%) of the 26 LHIs were relevant to Peace Corps Volunteers. Of these, Volunteers' health measures met or were more favorable than the goals of 13 (76%) of the LHIs. There were no data available for 4 (24%) of the LHIs. The entire Volunteer population has full access to primary care, oral health, and reproductive health services. No suicides or homicides were reported among Volunteers during the analyzed time period. Utilizing the LHIs, we have identified high-priority public health issues relevant for the Peace Corps Volunteer population. We discuss the need for quality data to measure and monitor Volunteers' health progress and outcomes over time, and also to standardize our measurements with Healthy People 2020 benchmarks. This framework may foster greater collaboration to engage in health promotion and disease prevention activities driven by evidence-based information, which may, in turn, encourage healthy behavior among Volunteers.

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1. Introduction

In July 1979, the U.S. Surgeon General released the report, "Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention". The report called for a commitment to reduce morbidity and mortality resulting from chronic conditions, infectious diseases, and injuries, and to strive for improved health for all Americans (Department of Health, Education, and Welfare, 1979). It served as a springboard for four subsequent Healthy People campaigns, the most recent being Healthy People 2020 (HP2020).

The purpose of Healthy People is to identify critical priority areas for public health and to encourage collaboration between a wide range of government institutions, academic centers, and community sectors to set goals for measurable health objectives (Koh et al., 2014). In Healthy People 2020, there are 42 topic areas with 1200

measurable objectives, many of which are prevention-oriented and actionable (Department of Health and Human Services, 2010). Of these, a group of 26 high-priority objectives have been selected as Leading Health Indicators (LHIs) (IOM, 2012). Although the focus of Healthy People has been on improving the health and well-being of Americans within U.S. borders, we analyzed health data of Peace Corps Volunteers (including medically cleared applicants whose medical conditions were determined unlikely to result in undue disruption over their 27 months of service) and compared them to HP2020 LHI baseline and target metrics.

Volunteers, who are U.S. citizens, spend 27 months living in low and middle-income countries, often in resource-challenged environments. All health care is provided by the Peace Corps throughout the course of their service, including medical evacuation if the health concern cannot be addressed locally. Applicants are required to complete pre-service screening. In addition to health care during service, Volunteers receive an entry physical, an in-service assessment at 15 months, and a close of service medical exam, as well as education and training on disease prevention. Since President John F. Kennedy established the Peace Corps on March 1, 1961, over 220,000 Volunteers have been invited by 140 host countries around the globe to work on issues including agriculture, education, business development, and health (Peace Corps, 2015).

[☆] Grants or financial support: This project was funded within the normal operating budget of the Peace Corps' Office of Health Services.

^{*} Corresponding author at: United States Peace Corps, Epidemiology and Surveillance Unit, 1111 20th Street Northwest, Washington, DC 20526, United States.

E-mail address: shenderson@peacecorps.gov (S.J. Henderson).

2. Methods

Existing data and information on Volunteers' and Trainees' health were extracted from five internal sources. Unless specified, data are from 2014. These included:

1. *Annual Volunteer Survey*: An annual survey of currently serving Volunteers. Tobacco and alcohol binge drinking data were obtained for the Substance abuse LHIs. These were self-reported data. In 2014, a total of 5344 Volunteers participated in the survey for a global response rate of 91.3%.
2. *Death In-Service (DIS) database*: Data for the mental health and injury and violence LHIs were obtained from the DIS database, which tracks causes of death among Volunteers and Trainees.
3. *Medical Applicant Exchange system (MAXx)*: Data were collected on medically-cleared applicants who began their training between January 1, 2013, and December 31, 2013, and met any of the following criteria identified for improvement by the LHIs:
 - i. Hypertension with uncontrolled blood pressure $\geq 140/90$ mm Hg;
 - ii. Body Mass Index (BMI) ≥ 30.0 ;
 - iii. Diagnosis of Type I and Type II Diabetes Mellitus with Hemoglobin A1c (HbA1c) values $>9\%$.

For this analysis, blood pressure, BMI, and HbA1c readings taken at a Volunteer's pre-service physical examination, conducted by their community physician of choice and reimbursed by Peace Corps, were compared to LHIs in the Preventive Services and Obesity LHIs.

4. *Technical Guidelines (TGs)*: TGs on contraception and HIV prevention and treatment, written for Peace Corps Medical Officers (PCMOs) to guide their care of Volunteers, describe the available medical benefits for all Volunteers with respect to reproductive and sexual health, and the protocols for their implementation.
5. *Peace Corps Manual 101, Section 2504 (The Peace Corps Act: Peace Corps Volunteers)*: This policy requires the Peace Corps to provide Volunteers with all necessary and appropriate health care during their service. Policy information from this document covers the access to health services LHIs.

Data collected on the LHIs were analyzed and compared to the U.S. national benchmarks established by HP2020. LHIs which only applied to children and adolescents were excluded as Volunteers must be 18 years of age or older. This study was exempt from IRB due to the fact that subjects' data could not be identified, directly or through identifiers linked to the subjects.

3. Results

Table 1 shows the demographic characteristics of Peace Corps Volunteers in 2013 and 2014. Of the 26 LHIs, 17 focus on adult health. Four were unable to be examined because the data were not collected or available. Of the 13 LHIs that were included in this analysis, 5 are about access to health services, including having health insurance, having a primary care provider, having a dental checkup, sexually active female having access to reproductive health services, including HIV screening. 100% of Volunteers meet those criteria. The remaining 8 LHIs are about health behaviors and those metrics were derived from internal surveys. The 17 LHIs applicable to Peace Corps and results of our analysis are described below and in Table 2.

3.1. Access to health services

All Volunteers (100%) have access to essential medical care and services throughout the course of their service. Peace Corps Medical Officers are contracted primary care providers, usually host country

Table 1

Demographic characteristics of Peace Corps Volunteers, 2013 and 2014.

	2013 ^a	2014 ^b
Total numbers	7209	6818
<i>Age—no. (%)^c</i>		
20–29	5837 (81)	5586 (82)
30–39	694 (10)	648 (10)
40–49	131 (2)	126 (2)
50–59	173 (2)	158 (2)
60–69	318 (4)	253 (4)
70–80	56 (<1)	47 (<1)
<i>Gender—no. (%)</i>		
Male	2673 (37)	2497 (37)
Female	4536 (63)	4321 (63)
<i>Race/ethnicity—no. (%)^c</i>		
American Indian or Alaska Native	11 (<1)	10 (<1)
Asian or Pacific Islander	329 (5)	307 (5)
Black or African-American	398 (6)	441 (6)
Hispanic or Latino	622 (9)	661 (10)
Two or more	242 (3)	237 (3)
White	5122 (71)	4850 (71)
Not specified	485 (7)	312 (5)

^a Peace Corps. Statistical report on all Peace Corps Volunteers and Trainees serving on September 30, 2013.

^b Peace Corps. FY 2014 Peace Corps Volunteers and Trainees On-Board Strength Statistics.

^c Percentages do not equal 100 due to rounding.

nationals, whole sole responsibility is to care for Peace Corps Volunteers. In this topic area, Peace Corps met and exceeded HP2020's baseline measures for persons with health insurance coverage and access to primary care; 83.2% and 76.3%, respectively.

3.2. Clinical preventive services

There were no data available to measure the proportion of Volunteers who had received colorectal cancer screening based on the most recent guidelines for the US population. Currently, Peace Corps does not routinely screen Volunteers for colorectal cancer during service.

Among 3344 Volunteers who began in-service training during 2013, 78 had diagnosed hypertension, and 66 of those (84.6%) had well-controlled blood pressure, meeting and exceeding HP2020's target goal of 61.2% for adults, while 12 (15.4%) of the Volunteers had uncontrolled high blood pressure.

Fourteen Volunteers (<1%) had Type I or Type II Diabetes Mellitus, and all 14 had HbA1c values less than or equal to 9%, exceeding HP2020's target goal of 16.1% for persons with diabetes with a HbA1c value $>9\%$.

3.3. Environmental quality

Although Peace Corps serves in a handful of countries with reliable AQI measurements (e.g., China, Mongolia), the majority of Peace Corps countries do not track AQI data in the rural areas where Volunteers frequently serve.

3.4. Injury and violence

Compared to the US population target goal of 53.7 deaths per 100,000 population, the rate of Peace Corps unintentional injury deaths was negligible (no injury deaths per 100,000 VT years in 2014). There were no homicide deaths among Volunteers, exceeding HP2020's target of 5.5 homicides per 100,000 population.

Table 2
Comparison of Healthy People 2020 Leading Health Indicators with Peace Corps Volunteers.

Leading Health Indicators/objectives		Healthy People 2020				Peace Corps Volunteers		
		Data source—US population	Latest data: year	Baseline (%)	Target (%)	Actual (%)	Benchmark data: year	Data source
<i>Access to health services</i>								
AHS-1.1	Increase the proportion of persons with medical insurance	NHIS, CDC/NCHS	2008	83.2	100	100	2014	Peace Corps Manual 101 Section 2504
AHS-3	Increase the proportion of persons with a usual primary care provider	MEPS, AHRQ	2007	76.3	83.9	100	2014	Peace Corps Manual 101 Section 2504
<i>Clinical preventive services</i>								
C-16	Increase the proportion of adults who receive a colorectal cancer screening based on the most recent guidelines	NHIS, CDC/NCHS	2008	52.1	70.5	Data not available	Data not available	N/A
HDS-12	Increase the proportion of adults with hypertension whose blood pressure is under control	NHANES, CDC/NCHS	2005–08	43.7	61.2	84.6	2013	MaXx
D-5.1	Reduce the proportion of persons with diabetes with an A1c value greater than 9%	NHANES, CDC/NCHS	2005–08	17.9	16.1	0	2013	MaXx
<i>Environmental quality</i>								
EH-1	Reduce the number of days the Air Quality Index (AQI) exceeds 100, weighted by population and AQI	AQS, EPA	2008	2,200,000,000 AQI-weighted people days	1,980,000,000 AQI weighted people days	Data not available	Data not available	N/A
<i>Injury and violence</i>								
IVP-1.1	Reduce fatal injuries	NVSS-M, CDC/NCHS; population estimates, census	2007	59.7 deaths per 100,000 population	53.7 deaths per 100,000 population	0 deaths per 100,000 PCV/T Years	2014	DIS
IVP-29	Reduce homicides	NVSS-M, CDC/NCHS; population estimates, census	2007	6.1 homicides per 100,000 population	5.5 homicides per 100,000 population	0 homicides per 100,000 PCV/T Years	2014	DIS
<i>Mental health</i>								
MHMD-1	Reduce the suicide rate	NVSS-M, CDC/NCHS; bridged-race population estimates for census 2000 and 2010, CDC and census	2007	11.3 suicides per 100,000 population	10.2 suicides per 100,000 population	0 suicides per 100,000 population	2014	DIS
<i>Nutrition, physical activity, and obesity</i>								
PA-2.4	Increase the proportion of adults who meet the objectives for aerobic physical activity and for muscle-strengthening activity	NHIS, CDC/NCHS	2008	18.2	20.1	Data not available	Data not available	N/A
NWS-9	Reduce the proportion of adults who are obese	NHANES, CDC/NCHS	2005–08	33.9	30.5	6.6	2013	MaXx
NWS-15.1	Increase the contribution of total vegetables to the diets of the population aged 2 years and older	NHANES, CDC/NCHS	2001–04	0.8 cup equivalent of total vegetables per 1000 cal	1.1 cup equivalent of total vegetables per 1000 cal	Data not available	Data not available	N/A
<i>Oral health</i>								
OH-7	Increase the proportion of children, adolescents, and adults who used the oral health care system in the past year	MEPS, AHRQ	2007	44.5	49	100	2014	Peace Corps Manual 101 Section 2504
<i>Reproductive and sexual health</i>								
FP-7.1	Increase the proportion of sexually experienced females aged 15 to 44 years who received reproductive health services in the past 12 months	NSFG, CDC/NCHS	2006–10	78.6	86.5	100	2014	TG 700
HIV-13	Increase the proportion of persons living with HIV who know their serostatus	NHSS, CDC/NCHHSTP	2006	80.6	90	100	2014	TG 712
<i>Substance abuse</i>								
SA-14.3	Reduce the proportion of persons engaging in binge drinking during the past 30 days—adults aged 18 years and older	NSDUH, SAMHSA	2008	27.1	24.4	15 ^a	2014	AVS
<i>Tobacco</i>								
TU-1.1	Reduce cigarette smoking by adults	NHIS, CDC/NCHS	2008	20.6	12	11 ^b	2014	AVS

Source: U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, DC. Available at <http://www.healthypeople.gov/2020/LHI/2020indicators.aspx>. Accessed July 3, 2014.

^a 3+ drinks per session.

^b 4× or more often per month.

3.5. Mental health

Peace Corps exceeded HP2020's target goals of 10.2 suicides per 100,000 population, respectively, with no suicide-related deaths among Volunteers in 2014.

3.6. Nutrition, physical activity, and obesity

Data were not available to measure the percent of Volunteers who met or exceeded baseline and target goals for the US population under the nutrition or physical activity LHI. Of the 3344 Volunteers who began in-service training in 2013, 222 (6.6%) had a BMI ≥ 30.0 , exceeding the target goal of 30.5% of US adults who are obese.

3.7. Oral health

All Volunteers (100%) have access to oral care services in-country, and receive at least one mid-service dental exam, which is more favorable than HP2020's target goal (49%) of persons who used the oral health care system in the past year.

3.8. Reproductive and sexual health

All sexually active female Volunteers (100%) have received routine reproductive health services, exceeding the HP2020 target goal of 86.5% of sexually active females aged 15–44 years, who received reproductive health services in the past 12 months.

All Volunteers (100%) undergo screening for HIV at both pre-service and close of service health evaluations and are informed of their HIV status, exceeding the HP2020 target goal of 90.0% of persons aged 13 years and older living with HIV who are aware of their HIV infection.

3.9. Substance abuse and tobacco

In 2014, 15% of Volunteers reported on the AVS that they engaged in binge drinking, which is more favorable than the HP2020 target goal of 24.4%. However, this is not a true comparison in that HP2020 defines binge drinking as males having five or more drinks and females having four or more drinks at the same time or within several hours of each other during the past 30 days, whereas the Peace Corps AVS asks "when you drink alcohol, how many drinks do you usually have?" among Volunteers who reported drinking.

HP2020 defines current smokers as persons who have smoked at least 100 cigarettes and now smoke either every day or some days. From the Annual Volunteer Survey, 11% of Volunteers reported having smoked four or more times per month. Peace Corps exceeded the HP2020 target goal of 12% of adults aged 18 years and older who smoke cigarettes every day or some days.

4. Discussion

To our knowledge, this is the first time that the Healthy People 2020 LHIs have been applied to the Peace Corps Volunteer population. Of the 17 LHIs applicable to the Volunteer population, Peace Corps exceeded 13 (76.5%) of the LHI targets set by HP2020. No data were available to measure the remaining 4 (23.5%) LHIs.

The structure and function of the Peace Corps health system lend itself to Volunteers automatically meeting or exceeding certain systems-based LHIs such as access to health care. Prior to becoming a Volunteer, all applicants undergo physical, mental health, and dental screening to ensure that they can effectively perform their Volunteer duties in their country of assignment for 27 months. Reasonable accommodations are made, whenever possible, for applicants with medical conditions. The Peace Corps Act requires Peace Corps to provide all necessary and appropriate health care to Volunteers during their service, including oral and mental health services. Peace Corps also provides significant

education and training on disease prevention and safety measures. Peace Corps' medical screening process and access to the Peace Corps health system are likely responsible for the vast majority of Volunteers' meeting or exceeding the major health indicators in HP2020, such as HIV testing.

Given the overall health of the Volunteer population and the rigorous medical clearance process, we anticipated that the proportion of medically-cleared applicants with hypertension whose blood pressure was under control would be close to 100%. The actual percentage (84.6%), although less than the expected 100%, was far greater than the baseline value for the US (43.7%) and the target value (61.2%).

Two of the compared measures, binge drinking and tobacco use, were measured with survey questions that were not fully congruent (e.g., HP2020 defined binge drinking as more than 5 or more drinks for males). If Peace Corps utilized the exact same survey questions as HP2020, the binge drinking target may not have been met. This is due to the fact that if the Volunteer reported, on average, she or he drank three drinks at a time, but occasionally drank four or five, this would not be captured as binge drinking in the AVS, but would have been classified as binge drinking by HP2020. The smoking target, however, is likely to have been met even with the discordant survey response categories. The health habits of Volunteers are likely unique when compared to the general US population; however, any difference with regard to drinking and smoking habits is not obvious enough for the authors to assume a higher or lower rate among Volunteers.

Education and training on disease prevention and safety measures may contribute to Volunteers' health metrics exceeding national benchmarks. In December 2013, Peace Corps improved its pre-service health training curriculum for Volunteers using the Global Learning Standards as a means to enhance their learning experience. Sessions were designed by PCMOs who have vast field experience and understand Volunteers' needs and concerns. The training sessions were designed to be interactive and informative using evidenced-based resources. The curriculum includes information on mental health adjustment and stress, food and water preparation, malaria, sexual health and STIs, alcohol awareness, safety and security, and HIV/AIDS. Health education provided to Volunteers, although specific to their particular country or region of service, could translate to improved health behaviors upon their return to the US, contributing a potential additional benefit of Peace Corps' extensive health education and training program.

There are several limitations to this study. The majority of Volunteers are young and relatively few have chronic conditions. This may be due to self-selection and the medical clearance process that ensures applicants are healthy to serve for 27 months with minimal disruption (healthy Volunteer bias). In 2014, the average age of Volunteers was 28 years and 94% of the Volunteer population had at least a college degree (Peace Corps, 2014). The relationship between education and health outcomes is well-established (Robert Wood Johnson Foundation, 2013). Data collected and analyzed on objectives related to diabetes, hypertension, and obesity were limited to medically-cleared Peace Corps applicants. In addition, it must be considered that there is variability in determining the diagnosis of diabetes or hypertension, as hundreds of community-based providers submitted clearance physicals. Peace Corps is unable to assess their consistency in diagnosis, as these data were taken from hundreds of providers across the US who were performing clearance physicals. We acknowledge that since the numbers of Volunteers are relatively small, if there were one suicide or homicide, the LHI goals would not be met.

Our analysis did not include trends of Volunteers' health conditions over time to compare with HP2020 national objectives, limiting the scope of the analysis.

Data on air quality at all Peace Corps posts was not available for this analysis. Poor air quality, particularly high levels of PM_{2.5}, measured by Air Quality Monitors, can result in adverse health effects (Cao et al., 2012). One of Peace Corps' Volunteer program areas is to protect the environment and enhance awareness about environmental issues through

education to communities where they serve. For example, Volunteers provide training sessions on construction and maintenance of improved cook stoves to reduce levels of indoor air pollution and fuel use. In the future, tracking and assessing the risk level of air quality in countries where Volunteers serve may help direct resources and efforts to reduce exposure to indoor and outdoor air pollution (Gordon et al., 2014).

While comparing the health of the Volunteers to the LHIs revealed important insights into the health of Volunteers compared with the US populations, there is also an opportunity to tailor HP2020 indicators to particular international health challenges, such as malaria, infectious gastrointestinal conditions, and water quality. For the first time, a set of Volunteer health indicators have been developed to improve tracking and accountability of Volunteer health. Additionally, the HP2020 framework provides Peace Corps with baseline measures for improving Volunteers' health care and an opportunity to normalize our measurements with national standards.

Transparency document

The [Transparency document](#) associated with this article can be found, in online version.

Acknowledgments

The study investigators wish to thank Ms. Angie McGowan and Ms. Carter Blakey from the US Department of Health and Human Services for their expertise and guidance.

References

- Cao, J., Xu, H., Xu, Q., et al., 2012. Fine particulate matter constituents and cardiopulmonary mortality in a heavily polluted Chinese city. *Environ. Health Perspect.* 120, 373–378.
- Department of Health and Human Services. Office of Disease Prevention and Health Promotion, 2010P. *Healthy people 2020*. ODPHP Publication No. B0132.
- Department of Health, Education, and Welfare, 1979. *Healthy people: the surgeon general's report on health promotion and disease prevention*. Public Health Service Office of the Assistant Secretary for Health and Surgeon General DHEW (PHS) Publication No. 79-55071. U.S. Government Printing Office, Washington, D.C.
- Gordon, S.B., Bruce, N.G., Grigg, J., et al., 2014. Respiratory risks from household air pollution in low and middle income countries. *Lancet Respir. Med.* 2, 823–860.
- IOM (Institute of Medicine), 2012. *Toward Quality Measures for Population Health and the Leading Health Indicators*. The National Academies Press, Washington, DC.
- Koh, H., Blakey, C., Roper, A., 2014. *Healthy people 2020: a report card on the health of the Nation*. *J. Am. Med. Assoc.* 311, 2475–2476.
- Peace Corps, 2014. *Peace Corps Volunteers and Trainees On-Board Strength Statistics (Internal Publication)* (Washington, DC).
- Peace Corps, 2015. *Fast facts*. <http://www.peacecorps.gov/about/fastfacts/> (Accessed November 15, 2015).
- Robert Wood Johnson Foundation, 2013. *Why does education matter so much to health?* Health Policy Snapshot: Issue Brief