

Veterans Reintegration Survey Design Focused on Healthcare Utilization Among Veterans

About the Series

The Veterans' Reintegration Survey (VRS) explored veterans' general experiences as they transition from military service due to the ongoing conflict that began in 2014. The topical areas in the VRS include veterans' service experience, healthcare, employment, well-being, and sociopolitical perspectives.

This document presents IREX's design to analyze healthcare utilization among veterans in Ukraine who responded to the VRS. The design uses multinomial logistic regressions, with individual and intervening characteristics as predictor variables. The dependent variables are the dummy variables if a veteran respondent sought physical or mental healthcare services.

I. Veterans' Healthcare Utilization

a. Summary Stats

Table 1: Summary Results of Healthcare Utilization by Female and Male Veterans

	<i>Females</i>		<i>Males</i>	
	Yes	No	Yes	No
Sought physical healthcare services after service	69.9%	30.1%	72.2%	27.8%
Sought mental healthcare services since returning from military service	46.9%	53.1%	29.9%	70.1%

Physical Healthcare

- Almost 72% of veterans sought physical care after ending their service compared to 28% who did not (Table 1).
- Male and female veterans' utilization of physical healthcare services is similar: 72% of male veterans and 70% of female veterans sought these services.

male veterans. Only 30% of male veterans sought mental healthcare services compared to 70% who did not. The distribution is noticeably more even among female veterans, with 47% stating they sought mental healthcare services compared to 53% who did not.

Mental Healthcare

- Table 1 shows that mental healthcare utilization is the opposite of physical healthcare access among veterans. Only 32% of veterans sought mental healthcare services.
- There were differences in utilization of mental healthcare services among male and fe-

b. Justification for Understanding Determinants: Insight into Action

The differences among veterans seeking physical healthcare (72%) compared to mental healthcare (32%) shown in Table 1 suggest that the former is a greater or more accepted healthcare issue among veterans. But mental healthcare results also suggest this might not be the case for female veterans. The summary outcomes indicate the need to explore and understand the reasons behind these differences. Therefore, we conduct-

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ed additional analyses on the VRS data to identify the determinants of seeking physical and mental healthcare services among veterans. We consider this an important inquiry for two reasons. First, exploring the possible reasons why veterans make the healthcare utilization decisions we observed will provide stakeholders with a more meaningful understanding of general healthcare conditions among veterans beyond what typical descriptive analyses can provide. Second, given that Phase II of the Veterans Reintegration Program will involve the design and implementation of appropriate health services, it is crucial that we understand the underlying causes to develop approaches that are actually responsive to veterans’ needs and meet the goal of bringing “insight to action.”

II. Estimation Model

The estimation model to address the research question is based on the conceptual framework that healthcare utilization is influenced by individual and intervening characteristics (Greenlick et al.,1968). Individual characteristics refer to social, economic, and situational attributes, and intervening characteristics refer to attitudinal factors that determine a veteran’s healthcare utilization decisions when she or he is faced with a perceived or existing medical condition. Under this framework, we identified the following applicable individual and intervening variables from the VRS data set:

Table 2: Individual and Intervening Variables for Healthcare Utilization

<i>Individual Variables</i>	<i>Unit</i>
• Duration of service	Number of days between the start and end dates of service
• Combatant	A dummy variable where 1 is an assignment to a combatant position and 0 to a noncombatant position
• Education	A categorical variable on completed levels of education
• Age	Age in complete years
• Sex	A dummy variable where 1 = Female and 0 = Male
• Employment	A categorical variable where 0 = Unemployed, 1 = Employed part-time, and 2 = Employed full-time
• Marital/civil status	A dummy variable where 1 = Married or Cohabiting and 0 = Single, Separated, Divorced, or Widowed
• IDP (internally displaced person)	A dummy variable where 1 = Is an IDP, and 0 otherwise
• Region ¹	A dummy variable where 1 = Urban and 0 = Rural
<i>Intervening variables:</i>	
• Self-assessment of physical or medical health	Respondents’ self-rating of health conditions where 0 = Extremely Poor Conditions and 10 = Best Condition
• Actual combat	A dummy variable where 1 means the respondent was in an actual combat experience and 0 otherwise

¹ We constructed this variable by transforming the Type of Settlement question in the survey.

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The dependent variables for analyses are the dummy variables if the veteran respondent (1) sought physical care for any reason after ending active service and (2) sought psychological healthcare services since returning from the military service.

Because the dependent variables are dummy variables, that is, binary or dichotomous variables with values of either 1 for Yes or 0 for No, the most appropriate regression method to use is logistic regression. Therefore, our analyses involved estimating two estimation models:

Table 3: Dependent and Independent Variables for the Specified Models

	<i>Dependent Variable</i>	<i>Independent Variables (Individual and Intervening)</i>
Model 1	Sought physical healthcare services	Self-assessment of physical health, actual combat experience, all individual variables
Model 2	Sought mental healthcare services	Self-assessment of mental health, actual combat experience, all individual variables

III. Methodological Considerations

The estimation model has to address some methodological considerations to ensure that the design is appropriate and that the obtained results are valid. These considerations include:

a. Simultaneity and Reverse Causation

In any single period analysis, the estimation model will always have to address the possibilities of simultaneity or reverse causation in the specification. Simultaneity occurs when the explanatory variable is jointly determined with the dependent variable. Stated simply, it is when X causes Y, but Y also causes X. A similar bias is reverse causation, which is when Y causes X, but X does not cause Y (Wooldridge 2013).

Because this analysis involves the estimation of the determinants of healthcare utilization, the unidirectional relationship between X and Y is intuitive and straightforward. A person seeks healthcare because he or she is sick. The reverse does not normally hold in natural settings: A person does not get sick because he or she visited a healthcare facility. Thus, we are not

concerned about possibilities of simultaneity or reverse causation in our specified model.

b. Multicollinearity

Another consideration in the estimation model is the high correlation between two or more explanatory variables such that one variable can be used to predict the other (and the other variable does not have any predictive powers as a result). Multicollinearity can skew the coefficients of the variables in the analysis (Gujarati 1995). In the estimation model, we initially identified being a combatant and having actual combat experience as possible correlated variables. The Ukrainian military assigns enlisted personnel to either combatant or noncombatant positions. Thus, having combat experience implicitly meant that the veteran was assigned to a combatant position, and we hypothesized that the experience would be a stronger predictor of healthcare utilization.

The most convenient way to detect the possibility of multicollinearity is to calculate correlation coefficients for all pairs of explanatory variables in order to identify results with high coeffi-

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clients. Annex A presents the results of our tests for the variables of Models 1 and 2. We previously set a value of 0.40 for possible multicollinearity, which was a “stricter” cutoff point compared to the values of 0.50 (and even 0.70) in the related literature. Annex A shows that none of the variables are highly correlated, per our cutoff point, so there is no risk of multicollinearity in the estimations.

c. Self-Reported Data

The local survey firm conducted face-to-face interviews with veterans and recorded self-reported responses. Thus, neither IREX nor the local firm was able to implement any verification

mechanisms or obtain externally observable data. Greenlick et al. (1968), for example, used medical records with documented diagnoses as an intervening variable, whereas our study is limited to using respondents’ self-assessment of physical and mental health conditions using a ranked scale. COVID-19 conditions also made it difficult to collect data through other means.

IV. Estimation Results

a. Determinants of Physical Healthcare Utilization

Table 4 presents the results for the logit regressions on physical healthcare utilization. The ta-

Table 4: Physical Healthcare Utilization

Logistic Regression	Number of Observations	=	1,380			
	LR chi ² (11)	=	169.6			
	Prob > chi ²	=	0			
Log likelihood = -723.45752	Pseudo R ²	=	0.1049			
<i>Physical Healthcare</i>	<i>Coef.</i>	<i>Std. Err</i>	<i>z</i>	<i>P > z </i>	<i>[95% Conf. Interval]</i>	<i>Interval]</i>
Physical self-assessment	-0.3110075	0.0373082	-8.34	0	-0.38413	-0.23788
Duration of service	-0.0000841	0.0000697	-1.21	0.228	-0.00022	5.25E-05
Combatant	0.286646	0.2141474	1.34	0.181	-0.13308	7.06E-01
Actual combat	0.4543324	0.1575976	2.88	0.004	0.145447	0.763218
Education	0.1099104	0.0395699	2.78	0.005	0.032355	0.187466
Age	0.0187249	0.0073218	2.56	0.011	0.004374	0.033075
Sex	0.0588973	0.2191635	0.27	0.788	-0.37066	0.48845
Employment	-0.1239866	0.0744304	-1.67	0.096	-0.26987	0.021894
Marital/civil status	-0.1019807	0.1374883	-0.74	0.458	-0.37145	0.167491
IDP	0.5477682	0.323902	1.69	0.091	-0.08707	1.182604
Region	0.001716	0.137312	0.01	0.99	-0.26741	0.270843
Constant	1.399703	0.5377696	2.6	0.009	0.345694	2.453712

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ble shows that a veteran’s own assessment of his or her physical health conditions is a significant determinant of seeking healthcare, which is a fairly intuitive outcome. The healthier a respondent feels, the less likely that she or he will seek healthcare services. Other significant determinants include actual combat experience, education, and age. These variables are significant because their $P > |z|$ values are below 0.05.

A coefficient in Table 4 is the expected change in the log odds of obtaining physical health-

care for a unit increase in the corresponding independent variable, holding other independent variables constant. For example, the age coefficient means the log odds of seeking physical healthcare increase 0.019 with a one-year increase in age.

Logit coefficients or log odds are not immediately intuitive to interpret and can even be hard to understand. To arrive at a more insightful interpretation of results, we calculated the odds ratios of the coefficients, presented in Table 5.

Table 5: Odds Ratios of Physical Healthcare Utilization

Odds Ratio						
<i>Physical Healthcare</i>	<i>Odds Ratio</i>	<i>Std. Err.</i>	<i>z</i>	<i>P > z </i>	<i>[95% Conf. Interval]</i>	
Physical self-assessment	0.7327084	0.027336	-8.34	0	0.681043	0.788293
Duration of service	0.9999159	0.0000697	-1.21	0.228	0.999779	1.000053
Combatant	1.331953	0.2852342	1.34	0.181	0.875399	2.026616
Actual combat	1.575122	0.2482353	2.88	0.004	1.156556	2.145168
Education	1.116178	0.0441671	2.78	0.005	1.032884	1.206189
Age	1.018901	0.0074602	2.56	0.011	1.004384	1.033629
Sex	1.060666	0.2324594	0.27	0.788	0.690282	1.629788
Employment	0.8833917	0.0657512	-1.67	0.096	0.763481	1.022136
Marital/civil status	0.903047	0.1241584	-0.74	0.458	0.689732	1.182335
IDP	1.729389	0.5601526	1.69	0.091	0.916615	3.262861
Region	1.001717	0.1375478	0.01	0.99	0.765359	1.311069

The odds of an event happening is the likelihood an event will occur, expressed as a proportion of the likelihood of the opposite outcome. Thus, an odds ratio is a more intuitive measure because it compares the relative odds of the outcome given a particular exposure, compared to the odds of the outcome happening in the absence of that exposure. It is an estimate of the association between independent

and outcome variables. In terms of odds ratios, the resulting significant variables are understood as follows:

- **Physical self-assessment.** Veterans have a 37% increase in the odds of seeking physical healthcare for a one-unit decrease in the self-assessment scale. Note the inverse relationship between self-assessment and

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actually seeking healthcare. So, the odds ratio of this variable is 1/0.737 or 1.365.

- **Actual combat.** Veterans who have experienced actual combat have 58% higher odds of seeking physical healthcare compared to veterans without combat experience.
- **Education.** Veterans with more education are likelier to seek physical healthcare. There is a 12% increase in the odds of seeking healthcare with a unit increase in education levels.
- **Age.** We estimate a 2% increase in the odds of physical healthcare utilization for a one-year increase in age.

b. Determinants of Mental Healthcare Utilization

Tables 6 and 7 show the results of the logit coefficients and odds ratios of mental healthcare utilization regressions, respectively.

As with the section on physical healthcare utilization, the odds ratios provide more intuitive interpretations of the results of variables with statistically significant outcomes. These include:

- **Mental health assessment.** Veterans have a 36% increase (1/0.735 or 1.359) in the odds of seeking mental healthcare for a 1-unit decrease in the self-assessment scale.
- **Combatant.** Veterans who were assigned to combatant positions have 69% higher odds of mental healthcare utilization com-

Table 6: Mental Healthcare Utilization

Logistic Regression	Number of Observations	=	1,363			
	LR chi ² (11)	=	186.34			
	Prob > chi ²	=	0.00			
Log likelihood = -784.85699	Pseudo R ²	=	0.11			
<i>Mental Healthcare</i>	<i>Coef.</i>	<i>Std. Err</i>	<i>z</i>	<i>P > z </i>	<i>[95% Conf. Interval]</i>	<i>Interval]</i>
Mental self-assessment	-0.31	0.03	-9.85	0.00	-0.37	-0.25
Duration of service	0.00	0.00	0.19	0.85	0.00	0.00
Combatant	0.53	0.24	2.18	0.03	0.05	1.00
Actual combat	0.4942991	0.1687	2.93	0.003	0.163653	0.824945
Education	0.0019256	0.0149904	0.13	0.898	-0.02746	0.031306
Age	0.0019799	0.0063934	0.31	0.757	-0.01055	0.014511
Sex	0.9778504	0.2026583	4.83	0	0.580647	1.375053
Employment	-0.1168806	0.0677045	-1.73	0.084	-0.24958	0.015818
Marital/civil status	-0.0989028	0.130693	-0.76	0.449	-0.35506	0.157251
IDP	0.0012251	0.2675918	0	0.996	-0.52325	0.525695
Region	0.3172583	0.1305191	2.43	0.015	0.061446	0.573071
Constant	0.3319506	0.4434979	0.75	0.454	-0.53729	1.201191

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Table 7: Odds Ratios of Mental Healthcare Utilization

Odds Ratio						
<i>Mental Healthcare</i>	<i>Odds Ratio</i>	<i>Std. Err.</i>	<i>z</i>	<i>P > z </i>	<i>[95% Conf. Interval]</i>	<i>Interval]</i>
Mental self-assessment	0.7354046	0.022939	-9.85	0	0.691792	0.781767
Duration of service	1.000013	0.0000699	0.19	0.851	0.999876	1.00015
Combatant	1.692143	0.4080126	2.18	0.029	1.054857	2.71444
Actual combat	1.639349	0.2765581	2.93	0.003	1.177806	2.281755
Education	1.001927	0.0150193	0.13	0.898	0.972918	1.031802
Age	1.001982	0.006406	0.31	0.757	0.989505	1.014616
Sex	2.658735	0.5388147	4.83	0	1.787195	3.955288
Employment	0.8896914	0.0602361	-1.73	0.084	0.779129	1.015943
Marital/civil status	0.9058307	0.1183858	-0.76	0.449	0.701134	1.170289
IDP	1.001226	0.2679198	0	0.996	0.592594	1.691635
Region	1.373357	0.1792493	2.43	0.015	1.063373	1.773706

pared to veterans who received noncombatant assignments.

- **Actual combat.** Veterans who experienced actual combat have 64% higher odds of seeking mental healthcare compared to veterans without combat experience.

- **Sex.** The odds for female veterans in seeking mental healthcare services are 166% higher than the odds for male veterans.
- **Region.** Veterans in urban settlements have 37% higher odds in seeking mental healthcare services.

References:

Greenlick, Merwyn R. et al. (1968). Determinants of medical care utilization. *Health Services Research* 1968 Winter 3(4), 296-315.

Gujarati, Damodar N. (1995). *Basic econometrics*. McGraw-Hill, Inc.

Wooldridge, Jeffrey M. (2013). *Econometric analysis of cross section and panel data*. The MIT Press.

Annex A: Correlation Coefficients of Independent Variables

Model 1

<i>Physical Healthcare</i>	Physical Self-assessment	Duration of Service	Combatant	Actual Combat	Education	Age	Sex	Employment	Marital/Civil Status	IDP	Region
Physical self-assessment	1										
Duration of service	-0.001	1									
Combatant	-0.115	0.062	1								
Actual combat	-0.105	0.084	0.328	1							
Education	-0.021	0.119	-0.003	0.027	1						
Age	-0.358	-0.039	0.081	0.032	0.043	1					
Sex	-0.059	0.023	-0.243	-0.257	0.030	-0.051	1				
Employment	0.265	-0.005	0.011	-0.054	0.003	-0.236	-0.026	1			
Marital/civil status	-0.046	-0.036	0.019	0.022	0.011	0.195	-0.021	-0.001	1		
IDP	-0.009	0.047	0.005	0.019	0.010	0.045	0.024	0.046	-0.016	1	
Region	0.055	0.001	0.013	-0.008	0.007	-0.051	0.084	0.055	-0.031	0.018	1

Model 2

<i>Physical Healthcare</i>	Physical Self-assessment	Duration of Service	Combatant	Actual Combat	Education	Age	Sex	Employment	Marital/Civil Status	IDP	Region
Mental self-assessment	1										
Duration of service	0.016	1									
Combatant	-0.052	0.060	1								
Actual combat	-0.105	0.083	0.327	1							
Education	-0.056	0.119	-0.003	0.027	1						
Age	-0.168	-0.042	0.081	0.031	0.042	1					
Sex	-0.077	0.026	-0.242	-0.255	0.031	-0.050	1				
Employment	0.211	-0.005	0.010	-0.056	0.003	-0.237	-0.025	1			
Marital/civil status	-0.001	-0.031	0.022	0.023	0.012	0.201	-0.024	-0.003	1		
IDP	-0.019	0.049	0.006	0.020	0.011	0.046	0.023	0.047	-0.018	1	
Region	0.015	0.005	0.013	-0.005	0.007	-0.052	0.085	0.060	-0.034	0.018	1