Research
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CCA

The Role of Sanitary Knowledge in Increasing Screening and Vaccination Rates

Applied Economics Final Project

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Overview

1. Research Question
2. Experiment
3. Results
4. Conclusions

Research Question

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Preventive Health Measures:

- Screening tests for various types of cancer
- Vaccinations
- Regular check-ups and self-examinations

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These proactive approaches play a crucial role in early detection and prevention of numerous diseases.

However, ***participation rates remain one of the issues to be addressed***.
$\rightarrow$ **Lack Awareness?**
$\rightarrow$ **Ineffective Measures?**

Literature review

- [1]: [A. Filia et al. 2014] Italy at the top of the European rankings regarding tetanus cases (44.3 %, 2013-2017)
- [2]: [P. Lu et al, 2017] Being female, being a college graduate, and working as a health care provider were significantly associated with a higher level of awareness (USA)
- [3]: [S. Blodt, et al 2012] Among 18/25-year-old male and female students in Berlin, only 50 % of the women and 25% of the men were aware of HPV.
- [4]: [M. N. Okobia et al, 2006] Knowledge of a sample of Nigerian women about breast cancer is very low, with a great dependence on education
- [5] [EU, DGHFS, 2019]A significant issue in Europe: the declining belief in the effectiveness of vaccination rates

Experiment

Designing the Ideal Experiment

- **POPULATION:** Two identical populations with similar levels of knowledge in medical prevention and medical science.
- **TREATMENT:** One-hour educational session focusing on common illnesses, their prevention strategies, and pertinent information.
- **COMPARISON:** Analysis of medical strategies adopted over three years post-intervention.
- **CHALLENGES:** Challenges include ensuring perfectly matched control groups, minimizing participant dropout, and accounting for external factors such as legal changes during the study period.
  $\Longrightarrow$ bias and compromises the reliability of results.

Experimental Design

1. We collected a total of 282 interviews with the questionnaire.
2. Participants complete a questionnaire, with and without treatment.
   - **Breast Cancer** (only for females): Screening conducted via mammography.
   - **Varicoceles** (only for males): Screening through urological visits.
   - **Tetanus**: Periodic vaccination.
   - **HPV Virus**: Self-administered vaccine.
   - **Ocotopatite Ghiandolare** (INVENTED): Screening via salivary tests.
3. Questionnaires are distributed among participants' friends and parents
   $\Longrightarrow$ potentially **external validity issues** (e.g., variations in education level).

Experimental Design

The Questionnaire

- Demographic information $\longrightarrow$ Controls
- Body health factors $\longrightarrow$ Prior knowledge levels and Randomization checks

Treatment allocation

- Information about each disease before the corresponding question:
  - Incidence rate, potential fatality rate, implications for personal health, risk of contagion, preventive measures, and early detection methods.
  - Willingness to undergo testing or vaccination is evaluated.

Data Collection

- We collected a total of 282 interviews with the questionnaire.
- 19 persons were removed due to incomplete questionnaire responses after treatment
- **Data Cleaning**
  i. Removal of irrelevant information flagged by Qualtrics
  ii. Creation of boolean variables for medical workers, employees, and students
  iii. Reclassification of 'Papilloma Virus' as non-ordinal, and exclusion of the subsample of individuals already vaccinated
  iv. After data cleaning, we had 131 treated and 132 untreated cases.
- Missing values addressed for smoking and alcohol consumption

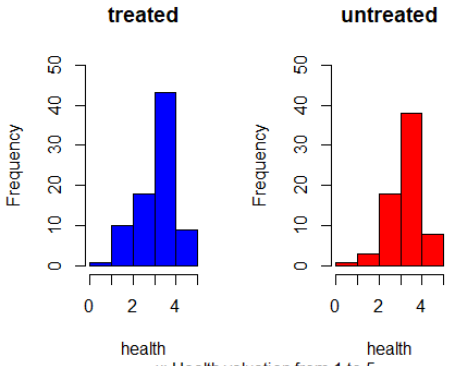
Descriptive statistics

Variable	Min	Median	Mean	Max	NA's
Age	1.00	3.00	4.02	7.00	0
Education	1.000	3.000	2.894	6.000	0
Occupation	1.000	2.000	4.026	9.000	0
BloodTest	1.000	2.000	2.536	4.000	0
Smoke	1.000	5.000	4.638	5.000	2
Alcohol	1.000	2.000	2.655	5.000	3
Drug	1.00	5.00	4.89	5.00	6
Fitness	1.000	3.000	2.636	5.000	0
Health	0.000	4.000	3.651	5.000	2
KnowledgeVaccine	2.000	3.000	2.603	3.000	0
Gynaecology	1.000	3.000	2.49	4.000	2
MammographyIntention	1.000	4.000	3.576	6.000	0
Treatment	0.000	1.000	0.543	1.000	0
Student	0.000	0.000	0.4437	1.000	0
MedicalWorker	0.00000	0.00000	0.03974	1.00000	0
Worker	0.0000	0.0000	0.3642	1.0000	0

Table 1: Descriptive statistics for women

- **Summaries** of the most important descriptive statistics provided for women, men, and both genders.

Did the randomization work?



Health variable for women

Variable	p-value
Age	0.4626
Education	0.2878
Occupation	0.7305
Blood Test	0.2814
Smoke	0.6344
Alcohol	0.5105
Drug	0.8360
Fitness	0.3495
Health	0.3655
Gynaecology	0.7677

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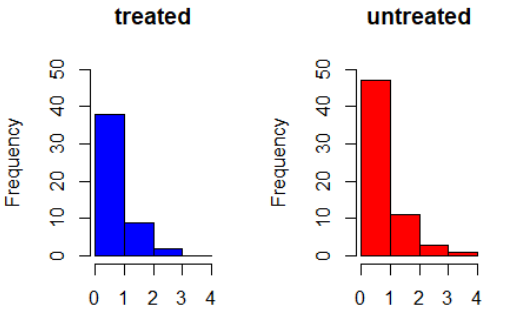

Testicular ultrasound for men

Variable	p-value
Age	0.4626
Education	0.2878
Occupation	0.7305
Blood Test	0.2814
Smoke	0.6344
Alcohol	0.5105
Drug	0.8360
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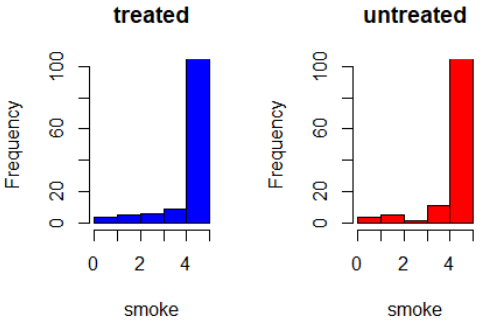

Smoke variable for men and women

Variable	p-value
Age	0.4626
Education	0.2878
Occupation	0.7305
Blood Test	0.2814
Smoke	0.6344
Alcohol	0.5105
Drug	0.8360
Fitness	0.3495
Health	0.3655
Gynaecology	0.7677

Results

Regression Table Breast Cancer

	(1)	(2)	(3)	(4)
Treatment	0.148	0.119	0.143	0.261
	(0.159)	(0.142)	(0.146)	(0.204)
Age	0.349***	0.346***	0.362***	
	(0.124)	(0.0526)	(0.0512)	
Education	-0.207***	-0.243***	-0.252***	
	(0.0776)	(0.0730)	(0.0753)	
Student	0.142			
	(0.433)			
MedWorker	-0.0787	-0.186	-0.156	
	(0.363)	(0.381)	(0.361)	
Worker	0.198			
	(0.220)			
BloodTest	-0.0701			
	(0.0748)			
Smoke	0.209**	0.198**	0.196**	
	(0.0917)	(0.0859)	(0.0826)	
Alcohol	0.0302			
	(0.0678)			
Drug	-0.188			
	(0.138)			
Fitness	0.0318			
	(0.0922)			
Health	-0.0569			
	(0.119)			
KnowV	0.330**	0.297*		
	(0.165)	(0.166)		
Gynaecology	0.167	0.225*	0.286**	
	(0.134)	(0.130)	(0.124)	
Constant	0.882	-0.00479	0.575	2.930***
	(1.049)	(0.540)	(0.401)	(0.158)
Observations	115	122	122	125

- Lower education levels and limited healthcare access show a stronger influence.
- Age, education, and smoking status emerged as significant controls. (respectively at 0.01, 0.01, and 0.05 significant levels).
- Age likely influences intentions due to higher adulthood cancer incidence.
- Gynaecology and knowledge of vaccines also impact the dependent variable when we have omitted some controls.
- Findings align with existing literature, particularly [6].

Regression Table Varicocele

	(1)	(2)	(3)	(4)
Treatment	0.346	0.438	0.338	0.362
	(0.317)	(0.292)	(0.292)	(0.289)
Age	-0.213	-0.0333	-0.0481	
	(0.160)	(0.0793)	(0.0791)	
Education	0.0996	0.119	0.168	
	(0.202)	(0.179)	(0.174)	
Student	-0.905			
	(0.856)			
MedWorker	1.231*	1.597***	1.464***	
	(0.679)	(0.331)	(0.297)	
Worker	-0.222			
	(0.626)			
BloodTest	0.0786	0.0816		
	(0.149)	(0.134)		
Smoke	0.0270			
	(0.184)			
Alcohol	-0.0892			
	(0.156)			
Drug	-0.158	-0.120		
	(0.145)	(0.136)		
Fitness	-0.0500	-0.0603		
	(0.158)	(0.143)		
Health	-0.0180			
	(0.220)			
KnowV	-0.0922			
	(0.327)			
TUltrasound	0.538**	0.508**	0.478**	
	(0.254)	(0.231)	(0.235)	
Constant	3.600*	1.732	1.241*	2.159***
	(2.085)	(1.046)	(0.717)	(0.198)
Observations	105	109	110	111

- No evident treatment effects observed.
- Significance of medical worker and Previous testicular examinations (*TUltrasound control*) impact dependent variable significantly at 5% level.
- Those who previously underwent tests show an inclination towards health monitoring. Do cultural factors influence the reason why some individuals, despite having more information, don't change their intentions?

Regression Table Tetanus

	(1)	(2)	(3)	(4)
Treatment	0.390**	0.262*	0.251*	0.303**
	(0.158)	(0.152)	(0.152)	(0.154)
Age	-0.132	-0.214***	-0.206***	
	(0.0876)	(0.0447)	(0.0436)	
Gender	0.151	0.123	0.143	
	(0.170)	(0.155)	(0.154)	
Education	-0.0525	-0.122	-0.126	
	(0.0843)	(0.0800)	(0.0788)	
Student	0.571			
	(0.391)			
MedWorker	1.256***	1.041***	1.047***	
	(0.286)	(0.251)	(0.258)	
Worker	0.261			
	(0.280)			
BloodTest	-0.105	-0.0535		
	(0.0727)	(0.0710)		
Smoke	0.0726	0.0506		
	(0.0779)	(0.0750)		
Alcohol	-0.0976			
	(0.0631)			
Drug	-0.0301			
	(0.0920)			
Fitness	0.0314			
	(0.0871)			
Health	-0.000887			
	(0.0970)			
KnowV	0.104	0.109	0.123	
	(0.156)	(0.154)	(0.152)	
Constant	3.851***	4.510***	4.551***	3.750***
	(0.941)	(0.594)	(0.435)	(0.110)
Observations	246	258	262	263

- Positive effect of the treatment on the inclination towards vaccination.
- With advancing age, people's willingness to vaccinate against tetanus decreases (negative coefficient for age at a level of 1%).
- Individuals working in the medical field show a higher inclination towards vaccination.
- Inclusion of control variables increases the treatment coefficient significance from 10% to 5%.

Regression Table HPV female and male

	(1)	(2)	(3)	(4)
Treatment	0.0541	0.115	0.136	0.0878
	(0.183)	(0.178)	(0.177)	(0.182)
Age	0.00765	0.00632	0.164***	
	(0.112)	(0.0966)	(0.0485)	
Gender	-0.794***	-0.792***	-0.718***	
	(0.195)	(0.187)	(0.184)	
Education	-0.0441	-0.0274	0.0108	
	(0.0948)	(0.0916)	(0.0911)	
Student	-0.680	-0.659*		
	(0.541)	(0.357)		
MedWorker	0.142	0.0964	0.170	
	(0.670)	(0.607)	(0.574)	
Worker	-0.0541			
	(0.336)			
BloodTest	0.156*	0.0967		
	(0.0838)	(0.0828)		
Smoke	-0.0187			
	(0.102)			
Alcohol	0.111			
	(0.0780)			
Drug	-0.00312			
	(0.0921)			
Fitness	0.0407			
	(0.0917)			
Health	-0.0841	-0.108		
	(0.112)	(0.105)		
KnowV	-0.169	-0.168	-0.213	
	(0.176)	(0.178)	(0.178)	
Constant	3.435***	3.874***	2.735***	2.500***
	(1.191)	(0.917)	(0.521)	(0.127)
Observations	246	257	262	263

- Treatment had no impact on the intention to receive vaccinations.
- Results vary significantly based on gender.
- High vaccination rate observed among females due to legislative push.
- Solution: focused our investigation solely on the male segment of the population.

Regression Table HPV male

	(1)	(2)
Treatment	-0.0955	-0.0573
	(0.1000)	(0.0981)
Age	0.0387	
	(0.0264)	
Education	-0.0508	
	(0.0488)	
Health	-0.0511	
	(0.0682)	
KnowledgeVaccine	-0.137	
	(0.0935)	
Constant	1.238***	0.685***
	(0.395)	(0.0639)
Observations	93	97

- No evidence of any discernible effect, likely due to the widespread belief that the Papilloma virus primarily affects women.
- This crucial issue is further emphasized by the findings [3].

Regression Table Ocotopatite Ghiandolare

	(1)	(2)	(3)	(4)
Treatment	0.271***	0.238***	0.238***	0.222***
	(0.0900)	(0.0876)	(0.0856)	(0.0837)
Age	-0.000317	-0.00739	-0.00613	
	(0.0477)	(0.0456)	(0.0261)	
Gender	-0.0315	-0.0287	-0.0340	
	(0.0937)	(0.0914)	(0.0880)	
Education	0.0801	0.0748	0.0659	
	(0.0501)	(0.0485)	(0.0472)	
Student	0.138	0.101		
	(0.219)	(0.204)		
MedWorker	0.172	0.169	0.0445	
	(0.367)	(0.361)	(0.353)	
Worker	0.188	0.177		
	(0.148)	(0.141)		
BloodTest	-0.0457			
	(0.0455)			
Smoke	-0.0361			
	(0.0354)			
Alcohol	-0.0196			
	(0.0377)			
Drug	-0.0526			
	(0.0382)			
Fitness	-0.0342			
	(0.0419)			
Health	0.0361	0.0216		
	(0.0631)	(0.0558)		
KnowV	-0.118	-0.119	-0.114	
	(0.0898)	(0.0895)	(0.0893)	
Constant	2.521***	1.982***	2.192***	2.061***
	(0.529)	(0.480)	(0.276)	(0.0577)
Observations	246	257	262	263

- High level of significance in the regression coefficient for the treatment variable.
- Able to reject the null hypothesis of no effect with a p-value of 1%.
- Effective randomization process: administered treatment has influenced participants' intent to undergo saliva tests.
- Marginal difference between treatment coefficients in long and short regressions suggests an absence of bias even without adding control.

Conclusions

Conclusions

- **Our initial question**:
  - How sanitary awareness and availability of screening tests influence individuals' decisions regarding preventive measures.
- **Impact of Information**:
  - Lack of prior knowledge leads to increased decisions on preventive measures, as we noticed for the invented disease.
- **Treatment effect**:
  - Among all the real diseases we have considered, only tetanus has a treatment significant coefficient.
  - The invented disease Ocotopatite Ghiandolare has a high level of significance in the regression coefficient for the treatment variable.
  - More complex conditions may require additional strategies beyond mere knowledge dissemination.

Resources I

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Resources III

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Resources IV

[11] N. Samat, S. Ghazali, and C. Atang, "Awareness and knowledge of cancer: A community survey in kedah and perlis," *Advances in Social Sciences*, vol. 10, no. 21, p. 10, 2014. DOI: 10.5539/ass.v10n21p10. [Online]. Available: http://dx.doi.org/10.5539/ass.v10n21p10.

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