BRIEF REPORT

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Mandatory vaccination support and intentions to get vaccinated for COVID-19: Results from a nationally representative general population survey in October 2020 in Greece

Theodoros V. Giannouchos PhD, MS[1,2] | Evaggelia Steletou MD, MS[3] | Maria Saridi PhD[4] | Kyriakos Souliotis PhD[4,5]

[1]Pharmacotherapy Outcomes Research Center, College of Pharmacy, University of Utah, Salt Lake City, Utah

[2]Laboratory of Health Economics & Management, Economics Department, University of Piraeus, Piraeus, Greece

[3]University Regional General Hospital of Patras, University of Patras, Patras, Greece

[4]Department of Social and Education Policy, University of Peloponnese, Corinth, Greece

[5]Health Policy Institute, Athens, Greece

Correspondence
Theodoros V. Giannouchos, PhD, MS, Pharmacotherapy Outcomes Research Center, College of Pharmacy, University of Utah, 30 South 2000 East, Salt Lake City, UT 84112, USA.
Email: theo.giannouchos@utah.edu

Abstract

Objectives: To explore rates and factors associated with mandatory vaccination support overall and intentions to get vaccinated specifically for COVID-19 among individuals in Greece.

Methods: Using data from a nationally representative cross-sectional survey conducted in October 2020 among 855 adults (≥18 years) in Greece, we estimated support rates for mandatory vaccination and respondents' intention to get vaccinated for COVID-19 as well as associations thereof with individual sociodemographic, clinical and contextual characteristics.

Results: About 74% of respondents supported mandatory vaccination and 62% intended to get vaccinated for COVID-19. The most prevalent reasons against COVID-19 vaccination were safety concerns related to the duration of clinical trials and potential side effects. Individuals who reported increased trust in healthcare authorities' recommendations, who revealed that their trust in the State increased due to the way the COVID-19 pandemic was handled, who used preventive services more often, and those with higher income were more likely to both support mandatory vaccination and to indicate intention to get vaccinated for COVID-19. Participants with worse or better self-reported health status (compared to average), younger adults, and females were less likely to intend to get vaccinated for COVID-19.

Conclusion: The survey revealed that the majority of the Greek citizens favour mandatory vaccination overall and intend to get vaccinated for COVID-19, driven mostly by utilization of preventive services and trust in healthcare authorities. However, intention to get vaccinated for COVID-19 was lower relative to mandatory vaccination support. This suggests a need to intensify evidence-based yet simplified messaging by esteemed healthcare providers to inform the public on the risks and benefits of vaccines.

KEYWORDS
COVID-19, hesitancy, patient preferences, prevention, public health, vaccination

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1 | INTRODUCTION

As vaccines against the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes COVID-19 become available to the majority of the population and vaccination rates increase globally in an attempt to achieve herd immunity, heated discussions spread among healthcare professionals, bioethicists, and legal entities regarding the potential to mandate vaccination.[1-3] A legal mandate to get vaccinated for COVID-19 coupled with coercive actions for individuals who opt-out of vaccination might be restrictive to individuals' rights, liberty, and autonomy and not ethically justifiable.[4] On the other hand, the growing evidence on safety and effectiveness of available vaccines, their wide availability, affordability, and accessibility minimize the burden of a potential mandate while providing increased societal welfare and utility gains by protecting both vaccinated individuals and mitigating person-to-person transmission.[5]

The decision to pursue a vaccine for the virus is not merely dependent on vaccine efficacy and safety but also driven by individuals' preferences, knowledge, attitudes, and characteristics. Recent estimates suggest a wide variation across multiple countries in both public support for mandatory vaccination and COVID-19 vaccination intentions and acceptance.[6] The consensus around COVID-19 vaccination intentions is currently between 50% to 70% in most countries, which is not sufficient to achieve herd immunity, thus raising concerns among stakeholders.[6-10]

Although, globally, well-established vaccines against many preventable diseases are widely accepted and their health, economic, and societal benefits recognized, concerns related to the fast approval processes of COVID-19 vaccines, coupled with limited multi-year data on their real-world effectiveness, are commonly cited reasons for hesitant attitudes towards novel COVID-19 vaccines.[1,9-14] Certain sociodemographic subgroups, in particular females, younger adults, those with lower educational level and income, and with negative views of vaccination in general, have also been found to be less likely to pursue COVID-19 immunization.[7,8,10]

In Greece, support for mandatory vaccination in the pre-pandemic period ranged from 65% to 97%.[11,12,15] Evidence from the first phase of the pandemic revealed that around 58% of the general population intended to get vaccinated for COVID-19, with higher rates observed for older adults, vulnerable populations, and those with more accurate knowledge regarding severity, symptoms, transmission, and prevention against the virus.[16] Among healthcare professionals, reported rates were 79%, mostly driven by absence of fear regarding vaccine safety and reliable information from healthcare authorities.[17] However, there is lack of evidence on how mandatory vaccination support has evolved during the ongoing pandemic.

In this study, we leverage data from a larger-scale project on preferences for healthcare policy reforms collected in October 2020 to explore rates and factors associated with support for mandatory vaccination overall and intention to get vaccinated specifically for COVID-19 among individuals in Greece. We further present evidence on the reasons to refuse COVID-19 vaccination. Our findings might inform and enable stakeholders to tailor healthcare policy interventions to certain subgroups of the population, to promote immunization uptake, while providing the framework for a potential mandate for vaccination.

2 | METHODS

We used data from a nationally representative, cross-sectional telephone survey conducted in October 2020 in Greece to obtain information on attitudes towards mandatory vaccination and intention to get vaccinated for COVID-19 among 1012 adult (18 years of age or older) Greek residents. More details about the survey and data collection process are described elsewhere.[18] The study was approved by the Ethics Committee of the University of Peloponnese.

2.1 | Study variables

The two outcomes of interest were whether individuals supported mandatory vaccination or not and their intention to get vaccinated for COVID-19, both defined as dichotomous (0 = No, 1 = Yes). Among those who refused to get vaccinated for COVID-19, we further obtained information on the reasons related to this unwillingness, namely "I think the clinical trials were too short and I do not feel safe", "Scared of side effects", "Vaccination serves other purposes", "Believe it's not effective", or "Not sure/Do not wish to answer".

Similar to previous work, we used multiple independent variables to estimate their association with the outcome variables of interest, which are described in detail in previous work.[18] These included: (a) sociodemographic and contextual characteristics, (b) health-related characteristics, (c) utilization of preventive healthcare services, and (d) information regarding trust and satisfaction with the healthcare system and how trust in the State was affected (increased, remained the same, decreased) by the way the COVID-19 pandemic was managed.

2.2 | Statistical analysis

Descriptive analyses were conducted to describe overall study participants, who were further stratified by their responses on the two outcomes of interest. We tested for statistical differences in the stratified mandatory vaccination and intention to get vaccinated for COVID-19 preferences using Pearson χ^2 test. We then used two multivariable logistic regressions to estimate associations between respondents' characteristics, their attitudes towards and utilization patterns of the healthcare system, and their preferences on the two outcomes of interest separately. SEs were clustered at the geographical region of residence. We used geographic-level fixed effects to control for unobserved regional characteristics. All statistical analyses were conducted using Stata (version 16.1; StataCorp, College Station, TX).

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TABLE 1 Descriptive characteristics and information of respondents overall and stratified by mandatory vaccination support and intention to get vaccinated for COVID-19

	All (n = 855)	Mandatory vaccination support			Covid-19 vaccination intention		
		No (n = 220)	Yes (n = 635)	P-value	No (n = 326)	Yes (n = 529)	P-value
%		25.7	74.3		38.1	61.9	
Gender (%)				.024			.050
Male	422 (49.4)	123 (55.9)	299 (47.1)		147 (45.1)	275 (52.0)	
Female	433 (50.6)	97 (44.1)	336 (52.9)		179 (54.9)	254 (48.0)	
Age groups (%)				.335			<.001
18 to 39	254 (29.7)	62 (28.2)	192 (30.2)		119 (36.5)	135 (25.5)	
40 to 54	234 (27.4)	70 (31.8)	164 (25.8)		86 (26.4)	148 (28.0)	
55 to 64	193 (22.6)	49 (22.3)	144 (22.7)		75 (23.0)	118 (22.3)	
≥65	174 (20.3)	39 (17.7)	135 (21.3)		46 (14.1)	128 (24.2)	
Education (%)				.001			.001
Elementary	33 (3.9)	11 (5.0)	22 (3.5)		13 (4.0)	20 (3.8)	
High School	259 (30.3)	86 (39.1)	173 (27.2)		112 (34.4)	147 (27.8)	
University	361 (42.2)	89 (40.5)	272 (42.8)		148 (45.4)	213 (40.3)	
MSc/PhD	202 (23.6)	34 (15.4)	168 (26.5)		53 (16.2)	149 (28.2)	
Occupation (%)				.116			.023
Full-time	464 (54.3)	122 (55.5)	342 (53.9)		175 (53.7)	289 (54.6)	
Retired	225 (26.3)	86 (25.4)	169 (26.6)		75 (23.0)	150 (28.4)	
Other (student/housewife)	82 (9.6)	14 (6.4)	68 (10.7)		32 (9.8)	50 (9.4)	
Unemployed	84 (9.8)	28 (12.7)	56 (8.8)		44 (13.5)	40 (7.6)	
Underage children living in the household (%)				.023			.038
No	679 (79.4)	163 (74.1)	516 (81.3)		247 (75.8)	432 (81.7)	
Yes	176 (20.6)	57 (25.9)	119 (18.7)		79 (24.2)	97 (18.3)	
Chronic conditions (at least one) (%)				<.001			.006
No	463 (54.2)	142 (64.6)	321 (50.6)		196 (60.1)	267 (50.5)	
Yes	392 (45.8)	78 (35.4)	314 (49.4)		130 (39.9)	262 (49.5)	
Rural residence (%)				.201			.684
No	737 (86.2)	184 (83.6)	553 (87.1)		283 (86.8)	454 (85.8)	
Yes	118 (13.8)	36 (16.4)	82 (12.9)		43 (13.2)	75 (14.2)	
Self-reported income (%)				<.001			<.001
Very low	239 (28.0)	79 (35.9)	160 (25.2)		119 (36.5)	120 (22.7)	
Low to average	218 (25.5)	64 (29.1)	154 (24.2)		87 (26.7)	131 (24.8)	
Average	313 (36.6)	65 (29.6)	248 (39.1)		100 (30.7)	213 (40.3)	
Higher than average	85 (9.9)	12 (5.4)	73 (11.5)		20 (6.1)	65 (12.3)	
Uninsured (%)				.413			.108
No	799 (93.4)	203 (92.3)	596 (93.9)		299 (91.7)	500 (94.5)	
Yes	56 (6.6)	17 (7.7)	39 (6.1)		27 (8.3)	29 (5.5)	
Do you have private insurance coverage? (%)				.558			.082
No	696 (81.4)	182 (82.7)	514 (80.9)		275 (84.4)	421 (79.6)	
Yes	159 (18.6)	38 (17.3)	121 (19.1)		51 (15.6)	108 (20.4)	
Self-reported health status (%)				.024			<.001
Average	147 (17.2)	26 (11.8)	121 (19.1)		38 (11.7)	109 (20.6)	
Bad/very bad	48 (5.6)	14 (6.4)	34 (5.4)		24 (7.4)	24 (4.5)	

TABLE 1 (Continued)

	All (n = 855)	Mandatory vaccination support			Covid-19 vaccination intention		
		No (n = 220)	Yes (n = 635)	P-value	No (n = 326)	Yes (n = 529)	P-value
Good	432 (50.5)	108 (49.1)	324 (51.0)		157 (48.2)	275 (52.0)	
Very good	228 (26.7)	72 (32.7)	156 (24.6)		107 (32.8)	121 (22.9)	
Trust in official healthcare authorities' guidelines and recommendations on healthcare issues (ie vaccination) (%)				<.001			<.001
No trust	127 (14.9)	67 (30.6)	60 (9.5)		92 (28.3)	35 (6.6)	
Somewhat	242 (28.4)	73 (33.3)	169 (26.7)		114 (35.1)	128 (24.3)	
Quite	314 (36.9)	58 (26.5)	256 (40.4)		95 (29.2)	219 (41.6)	
A lot	169 (19.8)	21 (9.6)	148 (23.4)		24 (7.4)	145 (27.5)	
How often do you use healthcare preventive services (ie checkup)? (%)				.007			.042
Never/Rarely	235 (27.5)	77 (35.0)	158 (24.9)		107 (32.8)	128 (24.2)	
Sometimes	289 (33.8)	77 (35.0)	212 (33.4)		107 (32.8)	182 (34.4)	
Often	292 (34.1)	57 (25.9)	235 (37.0)		99 (30.4)	193 (36.5)	
Very often	39 (4.6)	9 (4.1)	30 (4.7)		13 (4.0)	26 (4.9)	
How satisfied are you with the healthcare system? (%)				<.001			<.001
Not at all	252 (29.5)	90 (40.9)	162 (25.5)		133 (40.8)	119 (22.5)	
Somewhat	345 (40.4)	74 (33.6)	271 (42.7)		134 (41.1)	211 (39.9)	
Quite/Very satisfied	258 (30.1)	56 (25.5)	202 (31.8)		59 (18.1)	199 (37.6)	
How did your trust in the State and the authorities (ie healthcare system) change from the way the COVID-19 pandemic was dealt with? (%)				<.001			<.001
No change	247 (28.9)	57 (25.9)	190 (29.9)		82 (25.1)	165 (31.2)	
Increased	176 (20.6)	19 (8.6)	157 (24.7)		30 (9.2)	146 (27.6)	
Decreased	432 (50.5)	144 (65.5)	288 (45.4)		214 (65.7)	218 (41.2)	

3 | RESULTS

Overall, 855 individuals fully completed the survey (response rate: 84.5% - 95 individuals did not respond to the COVID-19 vaccine question; 62 individuals did not fully complete the questionnaire). Characteristics and responses of all respondents are presented in Table 1 (Table 1). About 74% supported mandatory vaccination and 62% intended to get vaccinated for COVID-19. About half reported a decrease in their trust in the State attributed to the way the COVID-19 pandemic was managed. Higher rates of both mandatory vaccination support and willingness to get vaccinated for COVID-19 were observed among those who reported increased trust in the State both due to the way the COVID-19 pandemic was handled and in general.

Among those who supported mandatory vaccination, 75% also reported an intention to accept COVID-19 vaccination (Table 2). Interestingly, one-quarter did not intend to get vaccinated for COVID-19 despite their support for a vaccination mandate, while a similar share (24.1%) intended to get vaccinated for COVID-19 despite not supporting mandatory vaccination. Among the 38% of participants who did not intend to get vaccinated for COVID-19, the

two primary reasons included safety concerns related to the duration of the clinical trials (60%) and potential side-effects (26%) (Table 3). However, we observed differences in the reasons related to unwillingness to get vaccinated for COVID-19 based on general support for mandatory vaccination, with conspiracy attitudes ("Vaccination serves other purposes") and effectiveness questioning being more prevalent among those who did not support mandatory vaccination either. In contrast, more than 90% of individuals who supported mandatory vaccination but did not intend to get vaccinated for COVID-19 reported safety concerns as the primary reason for their decision.

In the multivariable analyses, increased trust in the State and healthcare authorities during the pandemic and in general, frequent use of preventive services, higher than average incomes, and postgraduate educational level (compared to elementary) were associated with support towards mandatory vaccination and intention to get vaccinated for COVID-19 (although education was not statistically significant at the P < .05 level) (Table 4). In contrast, worse or better than average health status was inversely associated with support towards mandatory vaccination and intention to get vaccinated for COVID-19. Individuals who were more satisfied with the healthcare system in

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	Mandatory vaccination support		
	No (n = 220)	Yes (n = 635)	P-value
Covid-19 vaccination intention			<.001
No (n = 326)	167 (75.9)	159 (25.0)	
Yes (n = 529)	53 (24.1)	476 (75.0)	

TABLE 2 Mandatory vaccination support and intention to get vaccinated for COVID-19

TABLE 3 Primary reasons against COVID-19 vaccination overall and stratified by mandatory vaccination support

	All (n = 326)	Against mandatory vaccination (n = 167)	Mandatory vaccination support (n = 159)	P-value
Reasons for not willing to vaccinate against COVID-19 (%)				<.001
I think the clinical trials were too short and I do not feel safe	194 (59.5)	86 (51.5)	108 (67.9)	
Scared of side effects	84 (25.8)	45 (27.0)	39 (24.5)	
Vaccination serves other purposes	19 (5.8)	16 (9.6)	3 (1.9)	
Believe it's not effective	18 (5.5)	16 (9.6)	2 (1.3)	
Not sure/Do not wish to answer	11 (3.4)	4 (2.4)	7 (4.4)	

TABLE 4 Multivariable logistic regressions for mandatory vaccination support and intention to get vaccinated for COVID-19

	Mandatory vaccination support			Covid-19 vaccination intention		
	OR	95% CI	P-value	OR	95% CI	P-value
How did your trust in the State and the authorities (ie, healthcare system) change from the way the COVID-19 pandemic was dealt with? (Ref: No change)						
Increased	2.32	1.54-3.50	<.001	1.79	1.32-2.42	<.001
Decreased	1.16	0.80-1.70	.434	0.95	0.64-1.41	.814
Trust in official healthcare authorities' guidelines and recommendations on healthcare issues (ie vaccination) (Ref: No trust)						
Somewhat	2.16	1.10-4.23	.026	2.59	1.78-3.75	<.001
Quite	4.45	2.25-8.81	<.001	4.41	2.56-7.58	<.001
A lot	6.19	3.17-12.08	<.001	8.62	4.56-16.31	<.001
How often do you use healthcare preventive services (ie checkup)? (Ref: Never/Rarely)						
Sometimes	1.03	0.69-1.55	.869	1.22	0.66-2.28	.526
Often	1.94	1.41-2.68	<.001	1.60	0.90-2.82	.106
Very often	1.62	0.96-2.72	.068	2.15	1.05-4.40	.037
How satisfied are you with the healthcare system? (Ref: Not at all)						
Somewhat	1.29	0.85-1.98	.235	1.09	0.74-1.60	.669
Quite/very satisfied	0.80	0.46-1.40	.438	1.52	1.10-2.09	.010
Self-reported health status (Ref: Average)						
Bad/very bad	0.54	0.22-1.29	.164	0.36	0.17-0.78	.010
Good	0.60	0.23-1.55	.290	0.49	0.34-0.69	<.001
Very good	0.41	0.21-0.80	.009	0.26	0.17-0.42	<.001
Age-groups (Ref: 18 to 39)						
40 to 54	0.60	0.35-1.03	.064	1.37	0.95-1.98	.089

TABLE 4 (Continued)

	Mandatory vaccination support			Covid-19 vaccination intention		
	OR	95% CI	P-value	OR	95% CI	P-value
55 to 64	0.86	0.39-1.94	.722	1.44	0.82-2.52	.200
≥65	0.74	0.36-1.50	.401	2.41	1.16-5.02	.018
Self-reported income (Ref: Very low)						
Low to average	0.82	0.56-1.21	.322	1.08	0.74-1.57	.699
Average	1.16	0.69-1.94	.583	1.21	0.74-1.98	.445
Higher than average	2.44	1.07-5.61	.035	2.16	1.37-3.41	.001
Gender (Ref: Male)						
Female	1.41	0.97-2.04	.072	0.61	0.44-0.84	.002
Chronic conditions (at least one) (Ref: No)						
Yes	1.56	1.01-2.39	.043	0.93	0.76-1.13	.445
Occupation (Ref: Full-time)						
Retired	0.77	0.60-0.97	.028	0.61	0.31-1.21	.159
Other (student, housewife)	1.68	0.78-3.61	.187	1.05	0.41-2.68	.925
Unemployed	0.65	0.39-1.08	.098	0.67	0.34-1.32	.252
Education (Ref: Elementary)						
High School	0.90	0.37-2.22	.827	0.79	0.45-1.38	.410
University	1.44	0.59-3.48	.423	0.86	0.45-1.64	.647
MSc/PhD	2.42	0.62-9.46	.205	1.74	0.90-3.35	.100
Underage children living in the household (Ref: No)						
Yes	0.66	0.38-1.15	.144	0.69	0.45-1.08	.103
Rural residence (Ref: No)						
Yes	0.71	0.31-1.60	.405	1.02	0.58-1.78	.951
Uninsured (Ref: No)						
Yes	1.30	0.76-2.23	.333	1.34	0.93-1.93	.122
Do you have private insurance coverage? (Ref: No)						
Yes	0.66	0.49-0.90	.009	0.92	0.67-1.26	.590

Note: The regression models control for geographic-level fixed effects.
Abbreviations: CI, Confidence intervals; OR, adjusted odds ratio; Ref, Reference.

general and older adults, particularly those who were 65 years of age or older compared to those who were 18 to 39, were more likely to get vaccinated for COVID-19, while females were less likely compared to males.

4 | DISCUSSION

Our results suggest that about 74% of respondents supported mandatory vaccination overall, a relative decline of 13% compared to estimates from the same survey in 2019.[18] This finding could be related both to the observed decline in trust in healthcare authorities and the State during the pandemic as well as the uncertainty and widespread misinformation of vaccine efficacy during the past year.

We also found that 62% of participants intended to get vaccinated for COVID-19, a result consistent with global and country-specific estimates.[6-10] Interestingly, this share is higher compared to a

survey conducted during the same period among healthcare professionals in Greece, which indicated that 51.1% of healthcare personnel intended to get vaccinated for COVID-19.[19] This could be related to the baseline heterogeneity between the populations analyzed. Healthcare professionals were disproportionately younger and females in the study by Maltezou and colleagues compared to our study of the general population in Greece (<40 years old: 40.5% vs 29.7%; females: 65.0% vs 50.6%), and both younger age and female gender were inversely associated with the intention to get vaccinated for COVID-19.[19] Despite, both in our study and the study among healthcare professionals in Greece, the primary reasons for refusing COVID-19 vaccination were similar and mostly related to vaccine safety and information availability.[19]

Furthermore, our analyses revealed that certain subgroups of the population are less likely to intend to get vaccinated for COVID-19, particularly younger adults, females, lower-income populations, and those with worse or better than average self-reported health status.

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These findings are not surprising, since younger and healthier individuals might feel invincible to the virus, those with worse health status might be more concerned about increased susceptibility to vaccine-related side effects, while gender-related differences might be attributed to males being predominantly hard-hit by COVID-19, and to initial uncertainty about vaccination for pregnant and reproductive-age females.[20-22]

Beyond these characteristics, common factors associated with both mandatory vaccination support and intentions to get vaccinated for COVID-19 included increased trust in the State and healthcare authorities and more frequent use of preventive services. These findings are in line with growing studies on the topic, particularly those related to the positive effect of evolving knowledge and attitudes about vaccines during the pandemic towards vaccination support, thus highlighting the need to tailor more aggressive communication efforts regarding the benefits and risks of vaccination to specific subgroups of the population.[7,10,16,19,23]

Our data indicate that effective community outreach initiatives have the potential to increase COVID-19 vaccination uptake by almost 20% since 159 respondents supported mandatory vaccination but did not intend to get vaccinated for COVID-19 due to safety concerns. Effective, evidence-based messaging in plain language by trustworthy providers has the potential to convince a large proportion of the population to accept COVID-19 vaccination, and, in turn, increase vaccination uptake rate to more than 80%, sufficient to achieve herd immunity.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Theodoros V. Giannouchos: Conducted data and statistical analyses and wrote the first draft of the manuscript. **Kyriakos Souliotis:** Conceived, designed and scientifically led the study and coordinated study data collection. **Evaggelia Steletou, Maria Saridi, Kyriakos Souliotis:** Critically reviewed the manuscript for important intellectual content and contributed to the editing and writing of the final manuscript. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Theodoros V. Giannouchos https://orcid.org/0000-0002-1574-6767

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