

The willingness of Ethiopian public transport workers to receive COVID-19 vaccine; Cross-sectional study

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Abstract

Background

In Ethiopia, the approved vaccines for Corona-Virus disease (COVID-19) are being distributed to the population by their order of risk and exposure due to the limited number of available vaccines. Public transport workers are among those who are labeled as a high-risk population and on the frontlines of getting the COVID-19 vaccination. So this study was conducted to assess the magnitude of the COVID-19 vaccine intake among public transport drivers.

Methods

A community-based cross-sectional study was conducted among 384 participants in Gondar, Ethiopia from October 1, 2021 to November 15, 2021. The data was collected using self-administered questionnaires and analyzed. $P\text{-value} \leq 0.05$ in a multivariable logistic regression model was considered statistically significant.

Results

Among the 384 study participants, 196 (51%) of them received the COVID-19 vaccine. Among those who were not vaccinated, 95 (50%) of the participants did not take the vaccines due to fear of the adverse effects of the vaccines. In multivariate logistic regression analysis, being affiliated with the Islamic religion, having a health professional family member or friend, and having a history of sign/symptoms of COVID-19 in the study participants were found to be associated with the vaccination status against COVID-19.

Conclusion

The overall COVID-19 vaccine intake by the study participants was low. To enhance the magnitude of the vaccination of this high-risk population, governmental organizations and other stakeholders should focus on increasing awareness in order to increase the willingness of the population.

Key words: Covid-19, Magnitude, Vaccine Intake, Ethiopia, Public Transport Drivers

Introduction

Since the report of the occurrence of the first case of coronavirus disease in Wuhan, China in December 2019, the spread of the disease has been drastically increasing. This aggressive spread of the disease was finally declared a pandemic on March 11, 2020 [1, 2]. After the declaration of the disease as a pandemic, different forms of the virus have been reported as mutated and more virulent strains. This rapid spread and virulence of the disease has significantly affected the lives of people, the health of the public, the behavior of society and the national as well as global economy [3].

Since the occurrence of the disease, a number of medical and research institutions have joined in the search for medical treatment as well as the development of vaccines [2, 4]. These dedicated efforts of scholars resulted in more than 365 ongoing clinical trials, 125 vaccine candidates, and 18 vaccines which are approved for use by at least one country [5]. The process of discovery and approval of the vaccines took a very short time compared to the conventional vaccine approval process [6].

But as the vaccines against COVID-19 are available, the question of how to convince as many people as possible to get vaccinated will be raised next [7]. Because vaccine hesitancy, the reluctance of people to receive safe and recommended available vaccines, has been a problem for a number of vaccines discovered for the prevention of different diseases [5, 8]. The public's refusal to be vaccinated against COVID-19 has become a problem for the health sector and is one of the positive determinants of the pandemic's spread.

The problem is highly prevalent all over the world. In the developed nations, which are highly engaged in vaccine research and development, the unwillingness of the public to be vaccinated is found to be very common. The results of three independent public studies done on adults in the United States of America showed that the willingness of the study participants to receive the COVID-19 vaccine was 49%, 58%, and 69% [9-11]. The pooled survey done in different European countries showed that the overall willingness of the study participants was 58% [12]. In low-income countries as well, the problem is very common. The reported average willingness to be vaccinated against COVID-19 of seven different low-income countries was 80.3% [13]. Another study conducted by the African Centers for Disease Control and Prevention in partnership with the London School of Hygiene and Tropical Medicine to assess the willingness to get vaccination against COVID-19 among fifteen different countries in Africa, including Ethiopia, showed an average willingness to be vaccinated against COVID-19 is 79% [14].

In Ethiopia, there is a scarcity of studies on the magnitude of COVID-19 vaccine intake among specific populations. But there are different studies conducted to assess the willingness to receive the COVID-19 vaccine and showed the acceptance of COVID-19 vaccine is poor among different types of population. A population electronic survey done to assess the willingness of the study participants shows that the willingness to be vaccinated was 31.4% [15]. Another study done on school teachers showed that their acceptance of the vaccine was 54.8% [16]. A

similar community-based study in the southern part of the country showed that the acceptance of the population was 45.5 percent [17]. The acceptance rate showed some increment among the urbanized population (81.9%), health workers (61.6%), and university students (69.3%) [18-20].

COVAX, the global effort working on equal access to the COVID-19 vaccine, is estimated to cover the doses for about 20% of the Ethiopian population. If this is the only amount of COVID-19 vaccine available to the population in the country, vaccination may be distributed based on the risk level [16]. The Ethiopian Ministry of Health set the risk level of different populations, and public transport workers are among the groups of people listed just next to healthcare workers as the frontlines who should be vaccinated in order to minimize the expansion of the disease. So this study intended to assess the magnitude of COVID-19 vaccination status of the public transport drivers of Gondar city.

Methods

Study design and setting

A community-based cross-sectional study was conducted among public transport drivers in Gondar city from October 1, 2021, to December 15, 2021. The city is located about 727 kilometres away from Addis Ababa, the capital city of Ethiopia, and 180 kilometres away from Bahir Dar, the capital city of Amhara Regional State. In 2019, the total population of the city is estimated to be 500,788, of whom 300,000 were men and 200,788 women. According to the transport and logistics office of the Gondar city administration, there are 3962 registered bajajes, 502 mini-bus taxis and 35 public buses that provide a service in Gondar town.

Study population and sampling

The study participants were the public transport drivers in Gondar city, which includes bajajes, mini-bus taxis, and public buses. A single proportion population formula was used to calculate the sample size and, since there had been no similar study conducted before, the P was assumed to be 50%. The d value (the permissible margin of error of 5%) and $Z_{\alpha/2}$ (the value of the standard normal curve score corresponding to the given confidence interval of 1.96) correspond to a 95% confidence level. After adjusting for the total number of study populations, the final sample was 384.

Both probability and non-probability methods were used to select study participants. From ten public transport stations in Gondar city, four stations were selected using the lottery method, and the study participants from the selected four stations were approached using a convenient sampling method since it was impossible to prepare a sampling frame. The data collectors approached the public transport workers who were not on duty and had enough time to finish the questionnaire. For public bus drivers, the data collectors approached them in their respective offices after they finished their morning duty.

Data collection procedure

The data were collected using pretested, structured, and self-administered questionnaire prepared by the investigators from

different literature [15-18, 21]. Firstly, the tool was prepared in English and then translated into the local Amharic language. A pretest was done on 5% of the total sample size and modifications were made accordingly. The tool consists of socio-demographic characteristics, media exposure, common beliefs about vaccines, and the vaccination status against COVID-19 variables.

Trained graduating class pharmacy students conducted the data collection process under the supervision of the investigators. Safety precautions towards COVID-19 prevention were taken during the data collection process. Data collection facilitator and supervisors took one day training on the objective of the study, content of the questionnaire, and ethical issues need to be taken during the data collection process. Each returned instrument was reviewed for completeness and consistency on a daily basis.

Data Processing and Analysis

The quantitative data was cleaned before being entered into and analyzed with IBM SPSS Statistics for Windows, version 22.0. Descriptive statistics were carried out and presented with narration, tabulation, and graphical presentation. A binary logistic regression (bivariable and multivariable binary logistic regressions) analysis was performed to identify statistically significant variables. The statistically significant variables were established at p-value < 0.05 in a multivariable binary logistic regression model, and an adjusted odd ratio (AOR) with a 95% confidence interval was reported to measure the strength of association.

Definition of terms

Bajaje: An electric tricycle which can accommodate three passengers and the driver

Mini-bus taxi: A vehicle which can accommodate up to fifteen passengers and the driver

Public bus: A city bus which can accommodate up to fifty passengers and the driver

Results

Socio-demographic characteristics

All the collected questionnaires were found to be complete (a response rate of 100%). The majority (96.1%) of the respondents were males, and 70.6% of the study participants' age lies between 18 and 30 years. More than half (52.3%) of the respondents are single in their marital status, and about one third (29.2%) of the participants responded that they have children. More than three-quarters (77.6%) of respondents were Orthodox Christian religion followers, and 44.8% were high-school graduates. All of the participants reported using one or more forms of social media. Only 4.9% of the study participants' responses showed that they take chronic medications for different illnesses (Table 1).

Table 1: The Socio-demographic characteristics of the public transport drivers, Gondar, Northwest Ethiopia, 2021

Variables		Frequency (%)
Sex	Male	369 (96.1)
	Female	15 (3.9)
Age	18-30	271 (70.6)
	31-40	88 (22.9)
	41-50	25 (6.5)
Marital status	Single	201 (52.3)
	Married	154 (40.1)
	Widowed	14 (3.6)
	Divorced	15 (3.9)
Do you have children	Yes	112 (29.2)
	No	272 (70.8)
Average daily income	100-300	218 (56.8)
	301-600	102 (26.6)
	601-900	64 (16.7)
Educational background	Elementary school	74 (19.3)
	High-school	172 (44.8)
	College	138 (35.9)
Religion	Orthodox Christian	294 (77.6)
	Muslim	60 (15.6)
	Protestant Christian	17 (4.4)
	Catholic	13 (3.4)
Experience in years	1-5	298 (77.6)
	6-10	64 (16.7)
	11-15	22 (5.7)

Type of public transport	Bajaje	232 (60.4)
	Mini-bus taxi	134 (34.9)
	Public bus	18 (4.7)
Social media use	Yes	384 (100)
	No	0 (0)
Chronic medications	Yes	19 (4.9)
	No	365 (95.1)
Health professional family member of friend	Yes	186 (48.4)
	No	198 (51.6)
Any signs/symptoms of COVID-19 before	Yes	106 (27.6)
	No	278 (72.4)

Vaccine related responses of the public transport drivers

The study participants were asked about how they felt about vaccines generally and specifically about the COVID-19 vaccine. Most of the respondents (95.1%) agreed with the importance of vaccines for children and 81.3% agreed that vaccines reduce morbidity and mortality due to infectious diseases, while four-fifths (78.9%) of the study participants agreed that the benefit of vaccines outweighs its risks. Regarding COVID-19, 72.7% of the respondents feel that they are at risk of being infected by the virus, and 65.6% are afraid of the virus. More than half of respondents (58.6%) believe that COVID-19 vaccines are effective, and 45.5% believe that COVID-19 will be eradicated. Most

(79.2 %) of the study participants believe that the COVID-19 vaccine should be available for free, and one-third (32.6 %) of the participants responded that they would buy the vaccine. The association between the magnitude of COVID-19 vaccine intake and vaccine-related beliefs of public transport workers Among all the listed variables in Table 2, the only variable that did not have a significant association with the COVID-19 vaccine intake of the study participants was their belief in the thought that COVID-19 would be overcome (p-value = 0.68). The rest of the variables are significantly associated with the COVID-19 vaccine intake of the study participants (Table 2).

Table 2: Vaccine related responses of public transport drivers, Gondar, Northwest Ethiopia, 2021

Variables		Frequency (%)	Are you willing to take COVID-19 vaccine		P-value
			Yes	No	
Vaccines reduce morbidity/mortality due to infectious diseases	Agree	312 (81.3)	172	140	0.003
	Disagree	21 (5.5)	6	15	
	Not sure	51 (13.3)	18	33	
The benefit of vaccine outweighs its risks	Agree	303 (78.9)	164	139	0.02
	Disagree	49 (12.8)	16	33	
	Not sure	32 (8.3)	16	16	
Do you feel you are at risk of COVID-19	Yes	279 (72.7)	150	129	0.000
	No	85 (22.1)	27	58	
	Not sure	20 (5.2)	19	1	
Are you afraid of COVID-19	Yes	252 (65.6)	139	113	0.03
	No	132 (34.4)	57	75	
Is it possible to find effective vaccine to COVID-19	Agree	225 (58.6)	139	86	0.000
	Disagree	89 (23.2)	35	54	
	Not sure	70 (18.2)	22	48	
The COVID-19 vaccine should be available for free	Yes	304 (79.2)	165	139	0.013
	No	80 (20.8)	31	49	
Would you buy the COVID-19 vaccine	Yes	125 (32.6)	95	30	0.000
	No	259 (67.4)	101	158	
Do you think COVID-19 will be overcome	Agree	175 (45.6)	89	86	0.68
	Disagree	96 (25)	46	50	
	Not sure	113 (29.4)	61	52	

The magnitude COVID-19 vaccine intake by study participants

About half (51%) of the respondents in the current study took the COVID-19 vaccine (Figure 1). Half (50%) of those who did

not receive the vaccine did so because they believe the vaccines are unsafe, and a quarter (25%) do not believe the vaccines are effective (Figure 2).

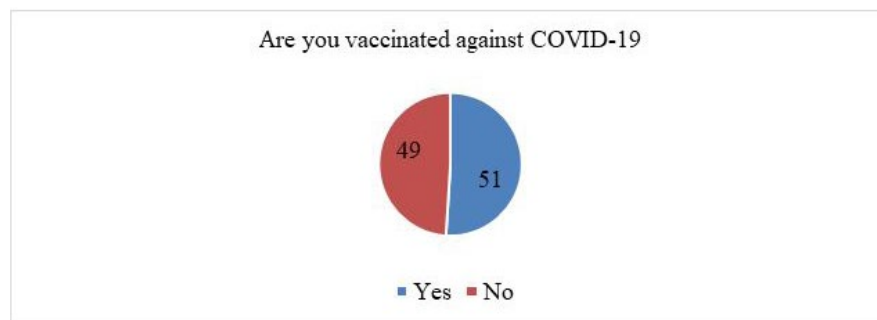
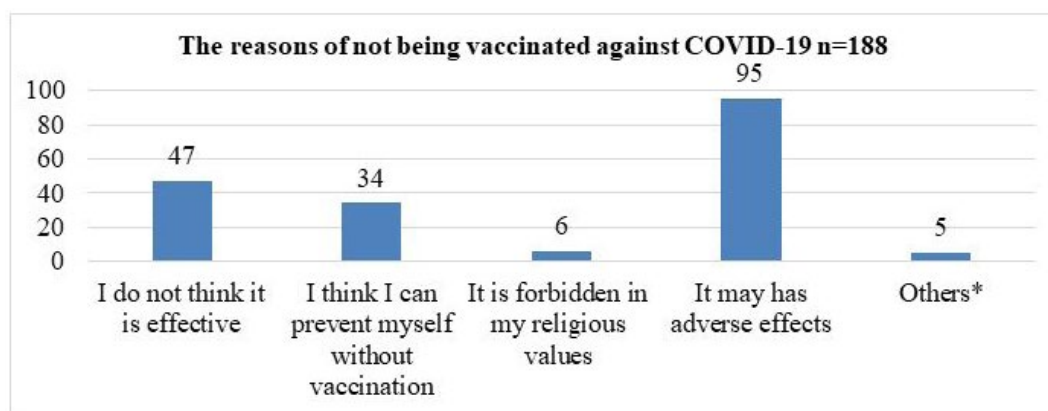


Figure 1: The magnitude of COVID-19 vaccination among public transport drivers, Gondar, Northwest Ethiopia, 2021



*Fear of injection, the disease is not real

Figure 1: The reasons of the respondents for not being vaccinated against COVID-19, Gondar, Northwest Ethiopia, 2021

Magnitude of vaccination against COVID-19 vaccine and associated factors

In multivariate logistic regression analysis, being affiliated with the Islamic religion [AOR: 10.95; 95% CI (1.46-81.99)] and

having a family member or friend who is a health professional [AOR: 0.01; 95% CI (0.001-0.03)] and of the study participants were found to be associated with the non-taking of vaccination against COVID-19 (Table 3).

Table 3: Bivariable and multivariable logistic regression analysis of associated factors of the magnitude of vaccination against COVID-19 among public transport drivers in Gondar, Northwest Ethiopia, 2021

Variables	Are you vaccinated against COVID-19		COR (95% CI)	AOR (95% CI)	
	No	Yes			
Sex					
	Male	183	186	1.97 (0.66-5.87)	0.63 (0.15-2.70)
	Female	5	10	1	1
Age					
	18-30	150	121	4.96 (1.81-13.60)**	1.27 (0.17-9.34)
	31-40	33	55	2.40 (0.82-7.00)	2.75 (0.50-15.06)
	41-50	5	20	1	1
Marital status					
	Single	146	55	3.03 (1.05-8.76)*	4.11 (0.48-35.30)
	Married	31	123	0.29 (0.01-0.86)*	0.29 (0.04-2.30)
	Widowed	4	10	0.46 (0.10-2.13)	0.24 (0.02-3.15)
	Divorced	7	8	1	1
Children					
	Yes	35	77	0.35 (0.22-0.56)***	1.26 (0.32-4.87)

	No	153	119	1	1
Average daily income					
	100-300	99	119	1.30 (0.74-2.29)	0.69 (0.15-3.03)
	301-600	64	38	2.63 (1.38-5.00)**	1.26 (0.31-5.20)
	601-900	25	39	1	1
Educational background					
	Elementary school	53	21	1	1
	High school	83	89	0.37 (0.21-0.67)**	1.08 (0.38-3.07)
	College	52	86	0.24 (1.30-0.44)***	1.03 (0.37-2.84)
Religion					
	Orthodox Christian	148	146	1.18 (0.39-3.60)	3.26 (0.59-18.14)
	Muslim	31	29	1.25 (0.75-4.25)	10.95 (1.46-81.99)**
	Protestant Christian	3	14	0.25 (0.05-1.31)	4.83 (0.34-68.36)
	Catholic	6	7	1	1
Number of years in work					
	1-5	138	160	1.51 (0.62-3.71)	0.79 (0.12-5.14)
	6-10	42	22	3.34 (1.22-9.18)**	3.60 (0.53-24.72)
	11-15	8	14	1	1
Type of public transport provide					
	Bajaje	121	111	1.71 (0.64-4.57)	1.04 (0.14-7.72)
	Mini-bus taxi	60	74	1.27 (0.47-3.49)	0.56 (0.08-3.97)
	Public bus	7	11	1	1
Health professional family member or friend					
	Yes	18	168	0.02 (0.01-0.03)***	0.01 (0.001-0.03)***
	No	170	28	1	1
Any sign/symptom of COVID-19 before					
	Yes	42	64	0.59 (0.38-0.94)**	2.75 (0.99-7.68)
	No	146	132	1	1

P*-value<0.05, ** *P*-value<0.01, **P*-value<0.001

Discussion

The main concern of health officials was vaccine hesitancy, which had previously been reflected in different types of vaccines developed. [22]. Even before the delivery and distribution of the vaccines to the public, different studies were conducted to assess the willingness of different population groups to accept the vaccines whenever they are available, and most of the studies showed a high proportion of unwillingness. Due to this, the vaccination practice have always faced challenges.

The result of the current study also showed that half (51%) of the study population did not take the COVID-19 vaccines. This shows half of the population who work on public transport services are not vaccinated against COVID-19. There is a scarcity of studies conducted to assess the COVID-19 vaccination status, but some studies are conducted to assess the willingness of different study participants to receive COVID-19 vaccines. A community-based study done in the same study area to assess the willingness of the population to receive the COVID-19 vaccine showed comparative results with the current study. The willingness to be vaccinated among school teachers, according to this study, was 54.8% [16]. And another study done in different parts of the country also showed a comparative result (45.5%) with the current study [17]. The results of the current study did not show much deviation from results reported from different Afri-

can countries about the willingness of the population to be vaccinated against COVID-19. In Nigeria, Ghana, and the Democratic Republic of the Congo, studies found that 50.2%, 51.0%, and 55.9% of people were willing to accept the vaccine, respectively (23-25). A survey conducted in a number of European countries (Italy (54 %), Germany (54 %), Sweden (50 %)) and the United States of America (48 %) also reported comparative results with the current study regarding willingness to receive vaccination against COVID-19 [26]. This low prevalence of willingness to receive vaccines needs the intervention of both governmental and non-governmental stakeholders to take whatever measures are necessary in order to increase the willingness of this group of people.

Some studies done in Ethiopia and other countries showed an increased willingness to receive the COVID-19 vaccine. But their vaccination status is not reported. Studies conducted among university students and health-care workers reported a willingness of 63.3 percent and 61.6 percent, respectively. An increased intention to receive the vaccine from this population is expected as compared to the transport workers, as being self-employed has been reported before for its negative association with the willingness to receive the vaccine [27].

The general beliefs about vaccines were significantly associated with the vaccination status of the study participants against COVID-19. The result shows participants with positive thoughts towards the COVID-19 vaccine took the COVID-19 vaccines more than those with negative thoughts towards vaccine-related beliefs. The study participants who believe that vaccines reduce morbidity/mortality due to infectious diseases (p-value=0.003), the benefit of vaccine outweighs its risks (p-value=0.02), the study participants who feel that they are at risk of COVID-19 (p-value=0.000), those who are afraid of COVID-19 infection (p-value=0.03), those who agree that it is possible to find an effective vaccine for COVID-19 (p-value=0.000) and those who even want to buy the vaccine if it is not available for free (p-value=0.000) showed a significant association with the intake of COVID-19 vaccine by the study participants. This could imply that increasing the awareness of the population about the COVID-19 vaccine could increase the positive attitude and so the magnitude of the COVID-19 vaccine intake.

From the respondents, 95.1 %, 81.3 %, and 78.9 % believed that vaccines are important for children, vaccines reduce morbidity and mortality due to infectious diseases, and the benefits of the vaccines outweigh their risk, respectively. These findings were higher than previous studies in Libya, which reported 83.4%, 86.1%, and 14.9% for the respective beliefs [21]. This shows the common beliefs regarding vaccines are positive and better than in the previous study, so that the magnitude of COVID-19 vaccine intake can also be increased by health education and media briefing since the respondents do not have bad feelings about vaccines in general.

Almost three-fourths (72.7%) of the respondents feel that they are at risk of being infected by COVID-19. While, 65.5% of the participants responded that they were afraid of COVID-19. This shows the participants of this study feel that they are more exposed than the respondents in other studies done in the southern and eastern parts of the country, which reported that 53.9% and 59.1% of the population, respectively, feel that they are at high risk of infection by COVID-19 (20, 28).

Most (79.2 %) of the respondents believed that the COVID-19 vaccine should be available for free, and only one-third (32.6 %) of the participants reported that they would buy the vaccine. The Libyan study found that 93.1 percent of respondents believed the vaccine was available for free and 48.2 percent were willing to pay for it. This indicates that the attitude of the participants of the current study to putting in efforts to get the vaccines is poorer than the participants of the Libyan study [21].

In the current study, being affiliated to the Islamic religion and having a health professional family member or friend were found to be associated with the status of vaccination against COVID-19 among the participants. In multivariate logistic regression, the odds of not being vaccinated against COVID-19 among the respondents were 10.95 times higher among Muslims when they were compared to the reference group. On the other hand, the odds of being vaccinated against COVID-19 were 100% higher among the respondents who had a health professional family member or friend. This could imply that the positive impact of health professionals who are close to the study

participants helps to increase their willingness to be vaccinated against COVID-19. And this shows both formal and informal awareness creation about the vaccines to the population helps to increase the willingness of the study participants to receive the vaccines so that the pandemic can be controlled.

Conclusion

The findings from this study show that the proportion of public transport workers in Gondar city to receive the COVID-19 vaccine was low. Being recruited to the Islamic religion and having a health professional family member or friend were associated with the vaccination status of the study participants against COVID-19. Since public transport workers work in a very crowded environment, vaccinating them prevents the spread of the pandemic. So, based on the findings of this study, it is highly recommended to increase the awareness as well as willingness of public transport workers by giving health education, vaccine campaigns, mass media and social media.

Limitation of the study

Since a cross-sectional study was the study design of the current study, it is difficult to establish the causal inferences. The non-probability sampling method used to approach the study participants may affect the representation of the population. The study was unable to address the transport workers of cross-country transport buses, which limits the study only to the city transportation system. With all these limitations, the findings of this study should not be undermined.

Ethical Consideration

This study was conducted after ethical clearance was gained from the research and ethics review committee of the School of Pharmacy. All of the study participants were provided with clear explanations about the purpose of the study and asked for their consent to participate in it. They were also informed that participation was voluntary and if they wanted, they could withdraw from the study at any stage. The data collected was kept confidential and, in addition, patient identifiers were not used, and the collected data was used for the purpose of the study only.

Data Availability Statement

The authors confirm that the data supports the findings of this study are available within the article. Raw data that supports the findings of this study are available from the corresponding author, upon a reasonable request.

Competing interests

Authors declare no conflict of interest.

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Authors' contributions

Asrat Ergena and Amensisa Tesfaye; Designed the methodology, Analyzed data and Wrote the main manuscript. Asmamaw Kasahun, Faisel Sima, Gizework Mekonnen and Wudneh Simegn; Reviewed the manuscript.

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