Canada's "COVID-19 Referendum": Voting in the Federal Election of 2021

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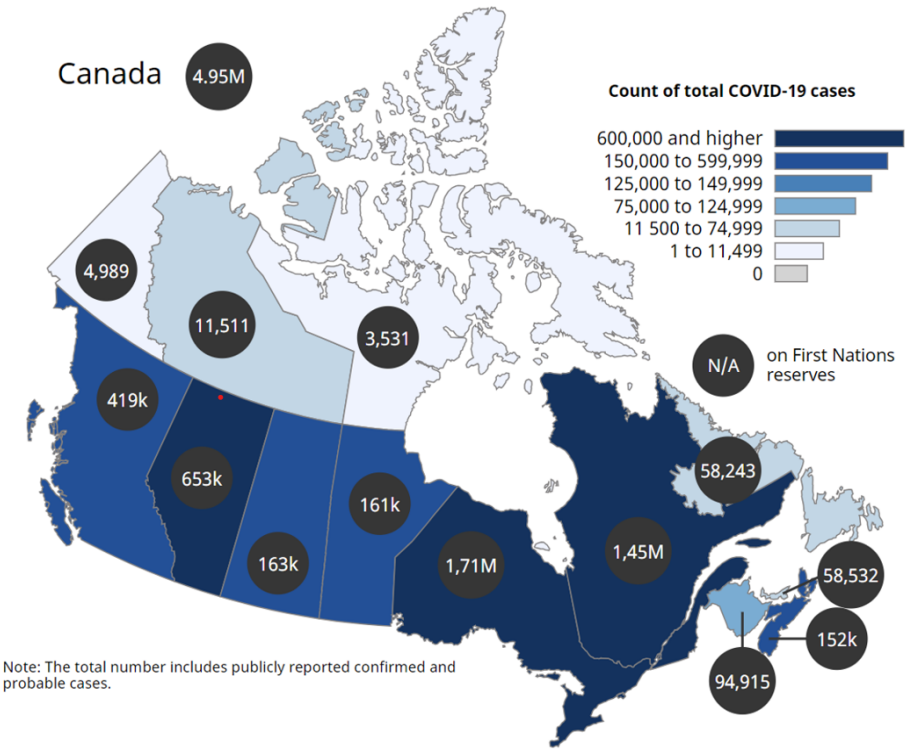
Introduction

Figure 1: Cumulative COVID-19 cases in Canada



Source: https://health-infobase.canada.ca/covid-19/current-situation.html?stat=num&measure=cases_total&map=pt#a2

- As a global health threat, the COVID-19 crisis not only endangers people's lives, but also negatively influences the worldwide economy, society, and public health.
- Under such uncertain times, countries confront the problem of whether to hold elections or not.

Dueling Influences of COVID-19 on Turnout

Source: https://globalnews.ca/news/8203111/alberta-polling-stations-concerns/

- There are health risks for people to vote in person during the COVID-19 pandemic.
- People may still turn out to vote to show either their satisfaction or dissatisfaction with the government's performance during the pandemic, particularly those most affected by COVID-19.

Previous Studies

- Recent studies use empirical evidence from different countries to examine the dueling influences of COVID-19 on voter turnout.
  - Constantino et al. (2021): Both temporal and spatial proximity of COVID-19 incidence matter in Brazil.
    - ★ Early incidence and the incidence closing the election day may have different influences on voter turnout.
    - ★ The COVID-19 incidence in neighboring municipalities also influences local voter turnout.

Previous Studies

- Most of the existing studies give support to the view that COVID-19 pandemic has had a negative impact on voter turnout.
  - Fernandez-Navia et al. (2021): The reduced voter turnout during the early stage of the pandemic in Spain is due to the perceived fear of COVID-19.
  - Parzuchowski et al. (2021): Higher COVID-19 mortality was associated with a lower increase in the Democratic vote share in 2020 presidential voting in the US compared to 2016.
  - Leromain & Vannoorenberghe (2022): COVID-19 risk significantly affects voting participation in the March 2020 French local elections. Voting participation decreased more in towns that have higher COVID-19 risks.
  - Picchio & Santolini (2022): Voter turnout in Italian local elections in 2020 was negatively affected by the COVID-19 outbreak.

Canada

- The 2021 Canadian federal election was called two years early.
- The Liberal party: Attempt to regain the majority government
- This paper
  - Analyze the influence of COVID-19 on voting outcomes during the 2021 federal election
  - Link the COVID data of health regions with the voting data of electoral districts
  - Estimations:
    - ★ Voter turnout and COVID-19 incidence rate
    - ★ Party shares and COVID-19 incidence rate
    - ★ Voter turnout and party dominant regions

Geographical Units

Figure 2: Health regions and electoral districts boundaries in Canada

Notes: Orange line: Electoral districts boundary (338 electoral districts); Gray line: Health regions boundary (92 health regions)

- Canada's COVID-19 data is collected at the health region level, while the election data is recorded at the electoral district level.
- ArcGIS is used to compare and match the borders, and adopt the larger unit, i.e., health regions, as the geographical unit in the analysis.

Geographical Units

- Each electoral district is partitioned into several parts, each belonging to different health regions with the corresponding weight.
- Each health region comprises various parts from different electoral districts, weighted accordingly.

Figure 3: Edmonton—Wetaskiwin boundary

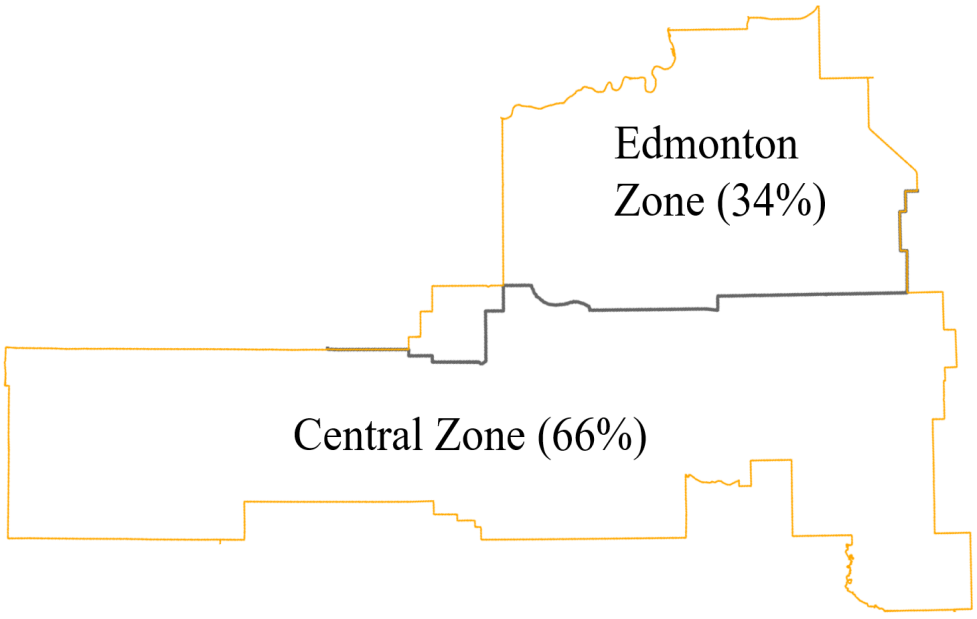
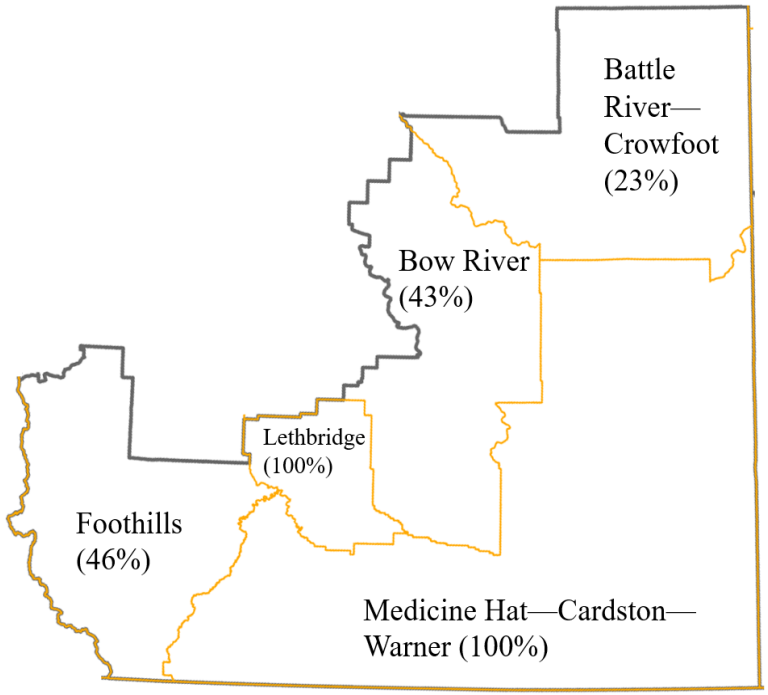


Figure 4: South Zone boundary



Orange line: Electoral districts boundary
Gray line: Health regions boundary

Data

- Voting data
  - Source: Elections Canada
  - Geographical unit adjusted from the electoral district to the health region calculation
- COVID-19 data
  - Sources: National and provincial official websites, such as the Public Health Agency of Canada and provincial weekly surveillance reports, complied by the COVID-19 Canada Open Data Working Group (CCODWG)
  - Daily confirmed cases and deaths: Calculated based on changes from the previous day, which sometimes results in negative numbers
  - Aggregated from daily to monthly in order to minimize the number of empty cells, especially for deaths
  - COVID-19 case and death variables log-transformed due to skewness consideration

Voter Turnout and COVID-19 Incidence Rate

- Dependent variable: Difference in voter turnout rates between 2021 and 2019 elections
- Main explanatory variables:
  - Cumulative numbers of COVID-19 cases and deaths were as of September 20, 2021, when the 2021 Canadian federal election happened
  - Monthly cases and deaths for the periods one month up to the election (August 20, 2021 - September 19, 2021), two months prior (July 20, 2021 - August 19, 2021), and three months prior (June 20, 2021 -July 19, 2021)
  - Numbers of cases and deaths earlier in the pandemic (March 1, 2020 - September 19, 2020)

Voter Turnout and COVID-19 Incidence Rate

$$\Delta(Vote_{2021-2019,h,p}) = \alpha + \beta \cdot log(COVID_{h,p}) + \gamma_p + \Delta\varepsilon_{h,p} \quad (1)$$

- $\Delta(Vote_{2021-2019,h,p})$: Change in voting outcomes, including voter turnout and party shares, in a health region h and province p, between the 2019 and 2021 elections
- $log(COVID_{h,p})$: Natural log of COVID-19 incidence, using confirmed cases or deaths, under a specific time horizon
- γ_p: Provincial fixed effects to pick up unmeasured variation in voting outcomes, such as local political culture or social capital, and COVID-19 protocols

Voter Turnout and COVID-19 Incidence Rate

Table 1: Voter Turnout Rate Differences and COVID-19 Cases: OLS Model

Dependent Variable: Difference in voter turnout rates between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Cases	-0.484***				
	(0.050)				
Log Cumulative Cases		-0.668***			
		(0.164)			
Log Cases 1st month			-0.634***		
up to the election			(0.189)		
Log Cases 2nd month				-0.643***	
before the election				(0.176)	
Log Cases 3rd month					-0.478**
before the election					(0.194)
Constant	-4.051***	-1.894	-3.920***	-4.967***	-5.052***
	(0.918)	(1.293)	(1.115)	(0.720)	(0.926)
N	88	88	88	85	81
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.408	0.452	0.418	0.423	0.365

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.
We dropped PEI and the three territories because each has only one health region within the province or territory.
The F-statistic is reported as missing in specification (4) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Party Shares and COVID-19 Incidence Rate

- Dependent variable: Difference in Liberal or Conservative vote shares between 2021 and 2019 elections

Table 2: Liberal Vote Share Differences and COVID-19 Cases: OLS Model

Dependent variable: Difference in Liberal vote shares between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Cases	0.437***				
	(0.151)				
Log Cumulative Cases		0.460***			
		(0.172)			
Log Cases 1st month			0.275*		
up to the election			(0.169)		
Log Cases 2nd month				0.334*	
before the election				(0.184)	
Log Cases 3rd month					0.248
before the election					(0.173)
Constant	1.252	0.192	2.138	2.497	3.676*
	(2.026)	(2.350)	(2.350)	(2.144)	(2.022)
N	88	88	88	85	81
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.436	0.422	0.387	0.415	0.395

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.
We dropped PEI and the three territories because each has only one health region within the province or territory.
The F-statistic is reported as missing in specification (4) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Party Shares and COVID-19 Incidence Rate

Table 3: Conservative Vote Share Differences and COVID-19 Cases: OLS Model

Dependent variable: Difference in Conservative vote shares between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Cases	-0.405***				
	(0.133)				
Log Cumulative Cases		-0.368**			
		(0.162)			
Log Cases 1st month			-0.454***		
up to the election			(0.167)		
Log Cases 2nd month				-0.364**	
before the election				(0.154)	
Log Cases 3rd month					-0.301
before the election					(0.196)
Constant	6.104***	6.721***	5.957***	5.043**	4.332**
	(1.963)	(2.302)	(2.195)	(2.027)	(2.091)
N	88	88	88	85	81
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.879	0.874	0.876	0.890	0.875

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.
We dropped PEI and the three territories because each has only one health region within the province or territory.
The F-statistic is reported as missing in specification (4) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Voter Turnout and Party Dominant Regions

- Dependent variable: Difference in voter turnout rates between 2021 and 2019 elections
- Variables of interest: Liberal regions and Conservative regions
  - Liberal region definition: If the Liberal share is greater than the Conservative share in a given region and the difference is larger than 15 percentage points
  - Conservative region definition: If the Conservative share is greater than the Liberal share in a given region and the difference is larger than 15 percentage points
  - Centrist region definition: If the difference between the Liberal share and the Conservative share is less than or equal to 15 percentage points

Voter Turnout and Party Dominant Regions

Table 4: Voter Turnout Rate Differences and Liberal Regions Voting[1]: OLS Model

Dependent variable: Difference in voter turnout rates between 2021 and 2019 elections						
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Liberal Regions	-1.561**	-0.910	-0.725	-0.990	-0.928	-1.296
	(0.613)	(0.900)	(0.819)	(0.907)	(0.800)	(0.806)
Log Early Cases		-0.294				
		(0.243)				
Log Cumulative Cases			-0.467*			
			(0.264)			
Log Cases 1st month				-0.329		
up to the election				(0.300)		
Log Cases 2nd month					-0.434*	
before the election					(0.254)	
Log Cases 3rd month						-0.154
before the election						(0.243)
N	63	63	63	63	60	56
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.323	0.356	0.384	0.350	0.371	0.332

[1] The Liberal regions are defined as follows: It is equal to 1 if the Liberal share is greater than the Conservative share in a given region and the difference is larger than 15 percentage points. It is equal to 0 if the difference between the Liberal share and the Conservative share is less than or equal to 15 percentage points.

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.

We dropped PEI and the three territories because each has only one health region within the province or territory.

The F-statistic is reported as missing in specification (4) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Voter Turnout and Party Dominant Regions

Table 5: Voter Turnout Rate Differences and Conservative Regions Voting[1]: OLS Model

Dependent variable: Difference in voter turnout rates between 2021 and 2019 elections						
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Conservative Regions	1.155**	0.987*	0.760	0.945*	0.919*	1.084*
	(0.594)	(0.574)	(0.554)	(0.503)	(0.501)	(0.557)
Log Early Cases		-0.147				
		(0.326)				
Log Cumulative Cases			-0.372			
			(0.370)			
Log Cases 1st month				-0.385		
up to the election				(0.327)		
Log Cases 2nd month					-0.381	
before the election					(0.312)	
Log Cases 3rd month						-0.114
before the election						(0.198)
N	71	71	71	71	68	65
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.396	0.401	0.422	0.425	0.416	0.401

[1] The Conservative regions are defined as follows: It is equal to 1 if the Conservative share is greater than the Liberal share in a given region and the difference is larger than 15 percentage points. It is equal to 0 if the difference between the Liberal share and the Conservative share is less than or equal to 15 percentage points.

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.

We dropped PEI and the three territories because each has only one health region within the province or territory.

Findings

- Statistically significant and negative relationship between local COVID-19 incidence rate and voter turnout
- In the regions with higher COVID-19 incidence rates, Liberal vote shares were higher, and Conservative vote shares were lower
- Conservative dominant regions associated with increased turnout, while Liberal dominance associated with decreased turnout

Thank you!

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Appendix

TA1: Voter Turnout Rate Differences and COVID-19 Deaths: OLS Model

Dependent Variable: Difference in voter turnout rates between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Deaths	-0.390***				
	(0.128)				
Log Cumulative Deaths		-0.461***			
		(0.158)			
Log Deaths 1st month			-0.885***		
up to the election			(0.220)		
Log Deaths 2nd month				-0.698*	
before the election				(0.375)	
Log Deaths 3rd month					-0.495*
before the election					(0.297)
Constant	-7.068***	-5.920***	-5.001***	-6.899	-6.349***
	(0.140)	(0.947)	(0.000)	-	(0.602)
N	68	85	56	46	57
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.408	0.385	0.452	0.391	0.313

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.
We dropped PEI and the three territories because each has only one health region within the province or territory.
The F-statistics are reported as missing in specifications (1) and (5) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Appendix

TA2: Liberal Vote Share Differences and COVID-19 Deaths: OLS Model

Dependent variable: Difference in Liberal Vote shares between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Deaths	0.430***				
	(0.159)				
Log Cumulative Deaths		0.349**			
		(0.143)			
Log Deaths 1st month			0.056		
up to the election			(0.339)		
Log Deaths 2nd month				-0.025	
before the election				(0.356)	
Log Deaths 3rd month					0.253
before the election					(0.282)
Constant	5.718***	3.968**	-3.930	1.570***	-0.024
	(0.174)	(1.963)	-	(0.000)	(1.745)
N	68	85	56	46	57
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.436	0.420	0.352	0.300	0.307

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.
We dropped PEI and the three territories because each has only one health region within the province or territory.
The F-statistics are reported as missing in specifications (1) and (5) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

Appendix

TA3: Conservative Vote Share Differences and COVID-19 Deaths: OLS Model

Dependent variable: Difference in Conservative vote shares between 2021 and 2019 elections					
Variable	(1)	(2)	(3)	(4)	(5)
Log Early Deaths	-0.290**				
	(0.125)				
Log Cumulative Deaths		-0.384***			
		(0.142)			
Log Deaths 1st month			-0.601**		
up to the election			(0.245)		
Log Deaths 2nd month				-0.543**	
before the election				(0.274)	
Log Deaths 3rd month					-0.170
before the election					(0.218)
Constant	1.866***	3.920*	11.101	-0.785***	2.660
	(0.138)	(2.070)	-	(0.000)	(3.770)
N	68	85	56	46	57
Province fixed effect	Yes	Yes	Yes	Yes	Yes
R-square	0.896	0.878	0.929	0.921	0.904

Notes: Province fixed effects are included. Standard errors are given in parentheses under coefficients. Significance level: ***1% **5% *10%.

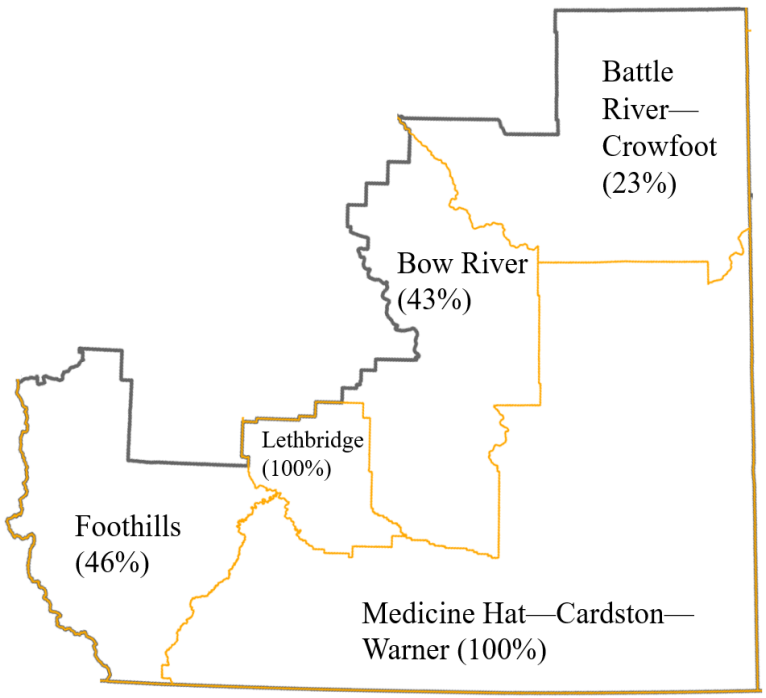
We dropped PEI and the three territories because each has only one health region within the province or territory.

The F-statistics are reported as missing in specifications (1) and (5) due to the similar problems with one or more provinces. We are aware of the problematic province(s) and will exclude them in further analysis.

The South Zone Voter Turnout Calculation

Back to Data

Figure 4: South Zone boundary



- Assuming that each electoral district has 1,000 eligible voters, the South Zone health region has a total of 3,120 eligible voters.
  $1,000 \times 23\% + 1,000 \times 43\% + 1,000 \times 100\% + 1,000 \times 46\% + 1,000 \times 100\% = 3,120$
- The voter turnout rates for the electoral districts of Battle River—Crowfoot, Bow River, Lethbridge, Foothills and Medicine Hat—Cardston—Warner are 71.8%, 62.5%, 65.2%, 71.7% and 60.9%, respectively, so the numbers of electors in these five electoral districts are 718, 625, 652, 717, and 609, respectively.
- The total number of electors in the South Zone is approximately 2,025.
  $718 \times 23\% + 625 \times 43\% + 652 \times 100\% + 717 \times 46\% + 609 \times 100\% = 2,024.71$
- The voter turnout in the South Zone is 64.9%.
  $2,025 \div 3,120 = 64.9\%$