



# Impact of COVID-19 Lockdowns on Food Security, Sustainable Food Supply, and Health in Italy: Insights from a Study on Eating Habits and Physical Activity <sup>†</sup>

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**Abstract:** The COVID-19 pandemic has notably influenced eating and lifestyle behaviors, prompting shifts in dietary habits. This study examines lockdown effects on eating patterns and health risks. Lazio, Italy, faced multiple lockdown phases, impacting activities and prompting containment. Studies revealed mixed diet changes during short-term lockdowns, yet long-term impacts remain understudied. The study aims to assess lockdown effects on eating habits and health risks through pre- and post-lockdown questionnaires. Data on eating behaviors, food habits, and taste were gathered pre- and post-lockdowns from a Rome obesity center. Ethical standards were followed, and 1256 individuals participated. All participants were contacted between May and July 2021, with the request to repeat the same online test. In total, 118 participants agreed and were included in this study. A structured questionnaire covered meals, food groups, favorite dishes, and activity. Dietary history and body composition assessments were performed. Analysis demonstrated significant shifts in food consumption patterns. Cereals and raw vegetable intake rose, while legume consumption decreased. Drinking habits changed, but alcohol intake remained steady. The study highlighted changes in diet and lifestyle, including reduced eating out and sleep disturbances. Physical activity remained stable, with more morning sports. The study uncovers COVID-19 lockdowns' impacts on eating habits and health risks, enriching our understanding of prolonged quarantine effects on food supply and security.

**Keywords:** COVID-19 lockdowns; food security; sustainable food supply; health; Rome; eating habits; physical activity



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## 1. Introduction

The COVID-19 pandemic has triggered significant shifts in eating and lifestyle behaviors, prompting alterations in dietary habits due to prolonged isolation. Short-term lockdown studies have highlighted both positive and negative impacts on nutrition [1,2]. In Italy's Lazio region, strict lockdowns occurred in phases, affecting commercial activities, gatherings, and education [3]. Gradual reactivation brought about new routines, with studies indicating increased home-cooked meals but also rising alcohol consumption, “comfort food” intake, and decreased sleep quality [4–6]. A more sedentary lifestyle emerged from increased screen time, remote work, and reduced physical activity opportunities [7–9]. While short-term effects have been studied [5–9], there is a gap in understanding long-term quarantine repercussions. To fill this void, our survey assessed pre- and post-lockdown lifestyle habits and health risk factors, shedding light on the pandemic's enduring impact.

## 2. Methods

In this study, we conducted an assessment of eating behaviors, food habits, and food preferences before and after lockdown periods at an obesity center in Rome, Italy. The pre-lockdown period was defined as before March 2020. A total of 1256 individuals participated in the initial survey between June 2018 and January 2020. Subsequently, 118 participants were included in the study after completing the same online test again between May and July 2021. Ethical approval was obtained, and informed consent was collected from all participants. Body composition evaluation was performed using Tanita BC-420 MA, and parameters including fat mass (FM) and fat-free mass (FFM) were recorded. The online questionnaire, taking about 30 min to complete, encompassed four parts: daily meals, eating disorders, food consumption frequency, favorite dishes, water and drink intake, and physical activity. Statistical analysis involved using StatTech v. 2.1.0 for quantitative variable assessment and normality testing. Non-normally distributed variables were described using median and quartiles. The Wilcoxon test was utilized to compare non-normally distributed quantitative variables between matched samples. The study hypothesis guided the statistical analysis, and the Bonferroni correction was not applied.

## 3. Results

A comprehensive investigation was conducted on a cohort of 118 participants, primarily composed of females (72%), with an average age of  $44.2 \pm 11.8$  years, who completed both survey iterations for rigorous analysis. The baseline characteristics furnished a comprehensive depiction of their demographic and health-related profiles. The average BMI was calculated at  $26.2 \pm 4.8$  kg/m<sup>2</sup>, while the delineation of body composition revealed adipose mass at  $22.2 \pm 9.6$  kg and lean mass at  $48.2 \pm 9.7$  kg. The participants' mean physical activity level was quantified at  $7.8 \pm 8.4$  METs/week. Within the subset, 5.4% had been diagnosed with type 2 diabetes mellitus, 17.8% presented hypertension, and 29.5% exhibited dyslipidemia. Significant alterations were conspicuously discerned in the participants' dietary patterns before and after the lockdown periods. These transitions were particularly evident in the varying consumption frequencies of distinct dietary constituents (Table 1). Notably, the ingestion of cereals, typified by spelt and barley, exhibited an upsurge from 66.9% 'before' to 76.3% 'after' ( $p = 0.008$ ). Moreover, there was a marked escalation in the consumption of raw vegetables, progressing from 78.8% 'before' to 92.4% 'after' ( $p < 0.001$ ). Conversely, the consumption of legumes demonstrated a decrement, transitioning from 94.1% 'before' to 87.3% 'after' ( $p = 0.034$ ). Turning attention to beverage habits, notable modifications manifested both pre- and post-lockdowns. A striking augmentation in water intake was registered, surging from 35.6% 'before' to 50.8% 'after' ( $p < 0.001$ ). In contrast, the consumption of sugar-sweetened beverages exhibited a reduction, declining from 39.8% 'before' to 60.2% 'after' ( $p < 0.001$ ). While the alterations in dietary and sleep patterns were reported, there was no discernible reduction in the temporal commitment to physical activities. The investigation also illuminated transformations in meal contexts, with notably fewer participants opting for extrinsic dining experiences (24.6% 'before' vs. 48.3% 'after';  $p < 0.001$ ), accompanied by a decline in company canteen lunch consumption (16% 'before' vs. 6.8% 'after';  $p = 0.012$ ). Concurrently, an increase in the prevalence of sleeping disturbances was ascertained.

**Table 1.** Changes in dietary and sleep patterns before and after lockdown measures.

|   | Before (n = 118) | After (n = 118) | Difference | p      |
|---|------------------|-----------------|------------|--------|
| Water Consumption (Litres/Day)                        |                  |                 |            |        |
| 0.0   | 4 (3.4%)         | 0 (0%)          | −3.4%      | <0.001 |
| 1.0   | 64 (54.2%)       | 47 (39.8%)      | −14.4%     |        |
| 2.0   | 42 (35.6%)       | 60 (50.8%)      | 15.2%      |        |
| 3.0   | 7 (5.9%)         | 10 (8.5%)       | 2.6%       |        |
| 4.0   | 1 (0.8%)         | 1 (0.8%)        | 0%         |        |
| Sugary Drink Consumption (Per Day)                    |                  |                 |            |        |
| 0.0   | 47 (39.8%)       | 71 (60.2%)      | 20.4%      | <0.001 |
| 1.0   | 23 (19.5%)       | 18 (15.3%)      | −4.2%      |        |
| 2.0   | 17 (14.4%)       | 15 (12.7%)      | −1.7%      |        |
| 3.0   | 14 (11.9%)       | 7 (5.9%)        | −6%        |        |
| 4.0   | 10 (8.5%)        | 5 (4.2%)        | −4.3%      |        |
| 5.0   | 2 (1.7%)         | 1 (0.8%)        | −0.9%      |        |
| 6.0   | 3 (2.5%)         | 1 (0.8%)        | −1.7%      |        |
| 7.0   | 2 (1.7%)         | 0 (0%)          | −1.7%      |        |
| Do you consume legumes?                               |                  |                 |            |        |
| NO  | 1 (0.8%)         | 5 (4.2%)        | 3.4%       | 0.034  |
| Rarely  | 6 (5.1%)         | 10 (8.5%)       | 3.4%       |        |
| Yes   | 111 (94.1%)      | 103 (87.3%)     | −6.8%      |        |
| Do you eat raw vegetables?                            |                  |                 |            |        |
| NO  | 18 (15.3%)       | 3 (2.5%)        | −12.8%     | <0.001 |
| Rarely  | 7 (5.9%)         | 6 (5.1%)        | −0.8%      |        |
| Yes   | 93 (78.8%)       | 109 (92.4%)     | 13.6%      |        |
| Do you consume cereals (E.g., barley, oat)?           |                  |                 |            |        |
| NO  | 22 (18.6%)       | 10 (8.5%)       | −10.1%     | 0.008  |
| Rarely  | 17 (14.4%)       | 18 (15.3%)      | 0.9%       |        |
| Yes   | 79 (66.9%)       | 90 (76.3%)      | 9.4%       |        |
| Do you get a good night’s sleep?                      |                  |                 |            |        |
| NO  |                  |                 |            |        |
| I have difficulty in initiating sleep                 | 12               | 10              | 6.7%       | 0.033  |
| I awaken prematurely before my desired sleep duration | 14               | 19              | 4.2%       |        |
| I experience multiple awakenings throughout the night | 39               | 34              | −4.3%      |        |
| YES (Total)   | 53               | 45              | −6.8%      |        |

#### 4. Discussion

During the COVID-19 lockdowns, significant shifts in individuals' eating habits and lifestyle behaviors were observed. While the prevailing notion suggests that lockdowns promote unhealthy dietary choices, our study demonstrates a nuanced impact. Many individuals capitalized on increased time at home, leading to favorable changes in dietary habits and cooking involvement [1,10]. The consumption of raw vegetables and whole grains increased, potentially influenced by health recommendations and greater time availability [11]. Water intake improved, and sugary drink consumption decreased, possibly due to heightened health consciousness [12]. A reduction in meals eaten outside the home,

especially at lunchtime, indicated altered meal contexts [13]. Physical activity patterns showed a “return to normal” with an emphasis on morning exercise. However, sleep disturbances persisted, reflecting the enduring psychological impact of the pandemic [14]. Limitations of this study are as follows: (1) the study was conducted in a single location (Rome, Italy), so the findings may not be generalizable to other populations. (2) The study was relatively small, with only 118 participants. This could limit the power of the statistical analyses. (3) The study was conducted over a relatively short period of time (2018–2021).

Despite limitations, our findings underscore the complexity of lockdown effects and offer insights into post-lockdown behaviors that may guide future research and pandemic planning.

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**Informed Consent Statement:** Written informed consent has been obtained from the patients to publish this paper.

**Data Availability Statement:** The datasets produced and analyzed during the present study are obtainable from the corresponding author upon reasonable request.

**Conflicts of Interest:** The authors declare no conflict of interest.

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