Ann Ig. 2025 Jul-Aug; 37(4): 450-464. doi: 10.7416/ai.2025.2684.

The impact of the Russia-Ukraine conflict on the energy expenditure of public Italian healthcare organizations – A nationwide interrupted series analysis

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Keywords: ITS model; sustainability; energy expenditure; hospital; Italian NHS
Parole chiave: Modello ITS; sostenibilità; spesa energetica; ospedali; Servizio Sanitario Italiano (SSN)

Abstract

Background. *Healthcare organizations are complex systems characterized as highly energy intensive structures. Italian healthcare organizations are under increasing pressure due to the external energy dependency, especially following the Russia-Ukranian conflict. Indeed, the ongoing war has generated low energy availability and outbreaking energy costs, thus leading to the aim of the study that is to measure the effect of the Russia-Ukraine war on the energy expenditure of public Italian healthcare organizations.*
Study design & methods. *An Interrupted Times Series analysis was conducted across the period 2017-2022. Details were provided for the nineteen regions and two autonomous provinces. The outcome used was the energy expenditure amount across public healthcare organizations, a Poisson regression model was used. The revenues of public healthcare organizations were included as an offset variable to convert the outcome into a rate and adjust for any potential changes in revenues over time.*
Results. *The model suggested that there is strong evidence of a rise in the energy expenditure following the conflict, with an increase of 56% [relative risk (RR) 1.75] in Italy. All the Italian regions registered a notable increase of the energy expenditure in public healthcare organizations after the conflict, despite inter-regional variability was observed.*
Conclusions. *Several interventions have been carried out to support enterprises and healthcare organizations in managing energy expenditure increases, though National strategies and investments should be set up to guarantee public healthcare organizations' sustainability in the long run.*

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Annali di Igiene : Medicina Preventiva e di Comunità (Ann Ig)
ISSN (print) 1120-9135 ISSN (online) 3035-5559

Introduction

Healthcare structures are energy-intensive buildings because of the all-weather operations, sophisticated medical equipment, and well-defined cleaning procedures and environmental parameters (1,2). In Spain, the average annual energy consumption of hospitals reaches 20% of the total consumption in the tertiary sector. Indeed, hospitals are highly complex organizations, comprising a wide range of services and functional units, and their energy expenditure is among the highest among non-residential buildings (3,4). In line, also the Italian healthcare organizations are highly intensive energy consumers (2), and the sector is under increasing pressure due to the Russo-Ukranian conflict. Indeed, since the Second World War, the ongoing Russo-Ukrainian war has been among the most relevant conflicts in Europe, causing multiple economic, geopolitical, and health issues (5). Historically, both Russia and Ukraine have been considered fundamental to global resource markets, particularly for energy. Specifically, Russia is the world's third largest producer and exporter of oil, the second largest producer and the largest exporter of natural gas, and the third largest exporter of coal (thermal and coking). Ukraine has large energy reserves and holds large gas storage and transportation capacity across Europe (6). On the other hand, the European Union is highly energy import dependent, with a natural gas import dependency rate of 84% in 2020 and 83% in 2021 (7,8). Italy registers a high energy import dependency of 94% in 2020 and 93% in 2021, with the highest share of natural gas in the energy mix across Europe. More specifically, Italy in 2021 had Russia as its first gas supply source, followed by Algeria and Azerbaijan (9). The Russo-Ukrainian war thus presents the European Union's dependency on Russian energy with a great challenge. Indeed, the price of natural gas has increased from 20 to 80€/MWh, with peaks to 180€/MWh between February 2021 and 2022, by taking up electricity prices (10). Furthermore, the major Russian governmental energy company has substantially halted exports to Poland, Bulgaria, and Finland, and the transit routes towards Europe through Poland and Ukraine have been progressively turned off (11). The shock brought about by energy availability and price hikes is causing several European governments to be concerned with the sustainability of industrial activities, especially those of highly energy-intensive organizations (12,13). Industry and public administration are among the most important sectors of Italy's economy, with the public administration sector placing third for energy consumption among European countries. In 2020, the Italian public administration sector consumed more than 20 thousand tons of oil equivalent, preceded only by Germany and France (14,15). As part of the Italian public administration, the National Healthcare Servic (NHS) provides assistance to all its citizens and accounts for 7.9% of the Gross Domestic Product (GDP) in 2020 (16). High energy intensity and costs in healthcare facilities, particularly in hospitals, associated with the ongoing war that has generated low energy availability and outbreaking energy costs, make an analysis of the impact of the war on healthcare organizations' energy expenditure crucial for the system's sustainability. This study measures the effect of the Russo-Ukrainian war on the energy expenditure of Italian public healthcare organizations. An Interrupted Times Series analysis has been conducted across the period 2017-2022. Furthermore, details are provided for Italy's nineteen regions and two autonomous provinces (APs).

Study context

The Italian NHS is a decentralized Beveridge system that includes nineteen regions and two APs. The healthcare services have been progressively transferred from the central government to the regions and APs, via subsequential legislative reforms since the early 1990s. Different organizational and funding models developed across regions and APs due to the implemented devolution policies (17). Furthermore, decentralization led to different levels of healthcare expenditure and financial performance (18). The healthcare system is organized and governed at different levels: national, regional, and local (19). The national government plays a stewardship role by defining the essential levels of care to be uniformly granted across Italy and distributing financial resources to the regional governments via general taxation. The regional entities supervise, organize, and deliver primary, secondary, and tertiary healthcare services, as well as preventive and health promotion services. Furthermore, they design and implement regional healthcare plans, coordinate regional strategies, allocate the healthcare budget to the regional organizations, and check that the services provided are appropriate, efficient, and of good quality. The local level is in charge of ensuring the delivery of primary, secondary and tertiary healthcare services via a bunch of healthcare organizations.

The legislative decree 502/1992 established that all Italian public healthcare organizations should change their accounting systems, moving from traditional financial accounting to accrual accounting, as is the case with private firms. The financial accounting system was regarded as limited because it only measures monetary disbursements incurred (i.e., expenditure) or monetary receipts (i.e., receipts), while accrual accounting also measures costs, returns, and results of daily administrative action (20). Furthermore, legislative decree 118/2011 provided for the harmonization of accounting systems and budget plans, a reform process of public accounting systems aimed at making the balance sheets of healthcare organizations homogeneous and comparable. Energy expenditure must be reported by public healthcare organizations in their income statement (21).

Methods

Data and outcome variable

To measure energy expenditure, we used balance sheets of public healthcare organizations extracted from the Open BDAP website of the Ministry of Economy and Finance (22). The balance sheets record the energy expenditure of each healthcare organization, the regional healthcare system, and the central government. As outcome variable, the quarterly energy expenditure per healthcare organization, region, and country was selected. Balance sheets were analyzed, and the records BA1610 – 'Heating expenditure,' BA1660 - 'Electricity expenditure', and BA1670 - 'Other utilities' were obtained across the nineteen regions and two APs. The record 'Other utilities' was selected since the coding procedures for heating and electricity expenditure are not the same across the regions, and the record 'other utilities' is used as a general heading. Specifically, teaching organizations could report heating costs under the 'Other utilities' heading by specifying the exact coding procedures in dedicated explanatory notes. All the records selected were totaled under the 'Energy expenditure' item. The choice of the outcome variable - 'Energy expenditure' - was made by considering the reference literature (23). The total energy expenditure was extracted from the balance sheets per quarter from January 2017 to December 2022. The total production value for the same period was also extracted to relate energy costs to production, considering that healthcare organizations modified their activities during the pandemic. Indeed, the COVID-19 pandemic forced some drastic changes in clinical and surgical activities (24,25). Planned surgical admissions declined, while emergency activities sharply increased (25). The production value was extracted through the record reference AZ9999 – 'Value of production.' The 'Value of production' consists of several components, mainly state funding, patients' co-payments, and revenue collected through the supply of core activities, hereafter revenues (26). Regional headquarters' energy expenditure was not considered since values were not reported or close to zero.

Statystical analysis

Following Lopez Bernal et al. (23), an interrupted series analysis to examine the trend and level of the public healthcare organizations' energy expenditure before and after the Russo-Ukrainian conflict was carried out. Initial summary statistics and plots were undertaken to gain familiarity with the data. Scatter plots of the time series were realized to identify the underlying trend, seasonal patterns, and outliers. As required for an ITS analysis (27), the chosen segmented regression model and its explanation are reported in (Appendix 1).

As is frequently the case of health data, here the outcome is the energy expenditure amount across public healthcare organizations, without loss of generality, therefore a Poisson regression model was used. Furthermore, the revenues of public healthcare organizations were included as an offset variable to convert the outcome into a rate and adjust for any potential changes in revenue over time (as it occurred due to Covid-19 pandemic). Furthermore, considering that energy expenditure could be affected by seasonal issues, an adjustment for seasonality through a Fourier term was conducted. Furthermore, the model was controlled for over-dispersion and autocorrelation. Indeed, when analyzing real data, it could occur that the variance is greater (over-dispersion phenomenon), and it could cause not-exact standard errors' estimation. Furthermore, when adopting standard regression models, it is often assumed that observations are independent. However, in time series data, it could occur that the assumption is violated due to consecutive observations that are more like one another than those that are further apart. This phenomenon is called autocorrelation (23,27).

All statistical analyses were performed with R free software (28). The analysis was conducted following Lopez Bernal et al., and the results are reported accordingly (23,27).

Results

Italian regional healthcare systems registered an energy consumption expenditure of 11.5 billion euros across the 2017-2022 period. Energy expenditure accounted for around 1.3% of healthcare organizations' revenues, with an increase in 2022 (2.3%).

As with all statistical analyses, initial summary statistics and plots were undertaken to familiarize with the data. A scatterplot of the time series showed that the incidence of energy expenditure over the revenues (from hereby on, energy expenditure rate) was constant across the 2017-2021 period and started to increase between late 2021 and early 2022 (Figure 1). The underlying trend seemed not to show seasonal patterns. Different energy expenditure rate trends were observed across Italian regions, a rate increase was observed between 2021 and 2022 in all the territories (Appendix 2).

Preliminary statistics showed that the mean energy expenditure rate shifted from 1.32 before to 2.29 after the start of the conflict. Table 1 shows basic statics both for the energy expenditure and the rate before and after the conflict.

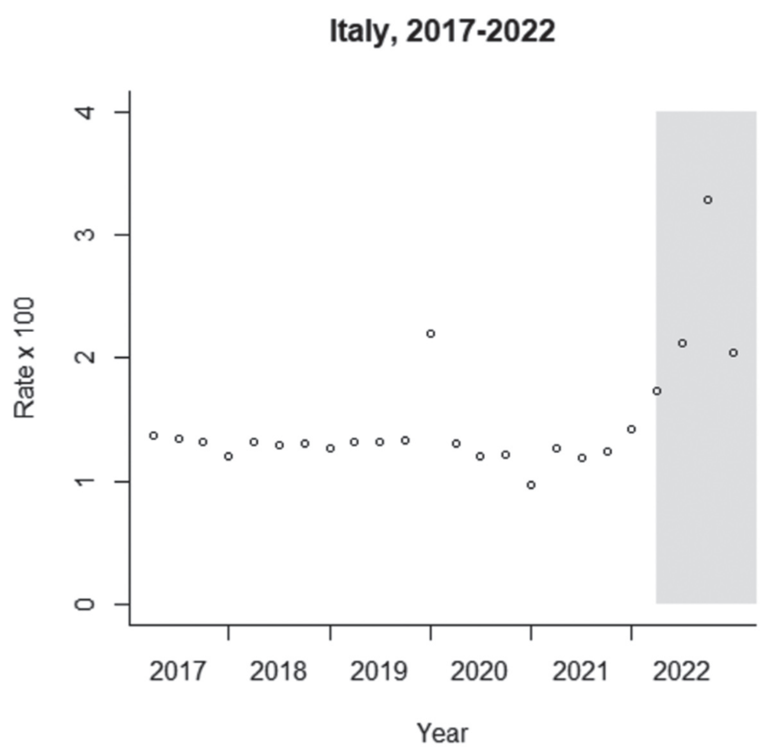

Figure 1 - The figure shows the energy expenditure rate (X100) of Italian public healthcare organizations across the period 2017-2022.

Table 1 - This table shows basic statics both for the energy expenditure and the rate before and after the conflict.

Min.	Lst Qu.	Median	Mean	3rd Qu.	Max
Energy expenditure – No conflict					
345,662,867€	399,568,171€	408,515,610€	425,379,281€	413,861,871€	728,228,887€
Energy expenditure – Conflict					
572,200,000€	679,900,000€	772,200,000€	800,400,000€	892,700,000€	1,085,000,000€
Energy expenditure rate – No conflict					
0.9734	1.2406	1.3068	1.3225	1.3269	2.2034
Energy expenditure rate – Conflict					
1.736	1.966	2.080	2.294	2.409	3.281

(Segue Tab. 1)

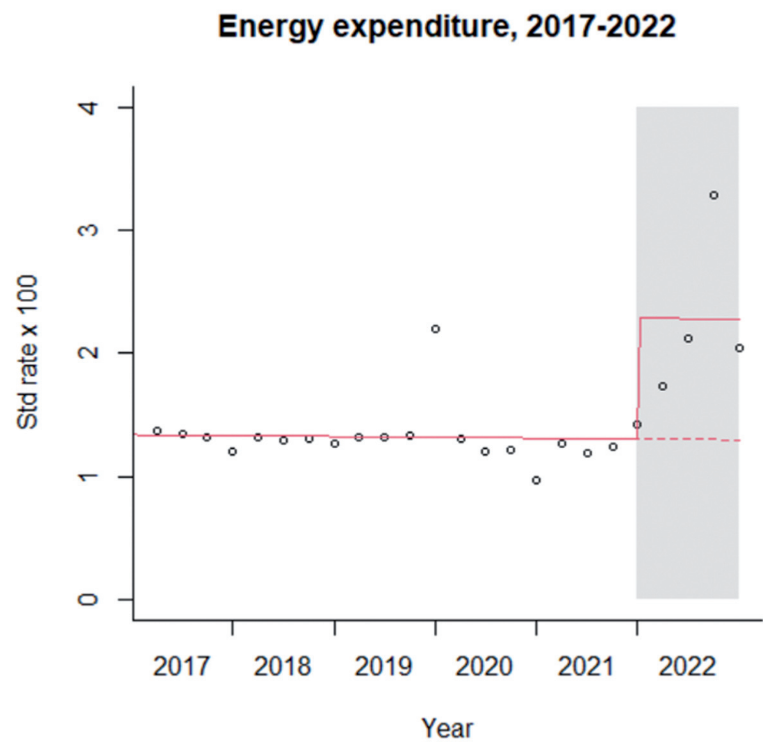

Figure 2 - This figure displays the pre-intervention trend of quarterly energy expenditure rate (continuous line), and the counterfactual scenario (dashed line) for the Italian public healthcare organizations.

Poisson regression model suggested that there is strong evidence of a rise in energy expenditure following the conflict, with an increase of 56% [relative risk (RR) 1.75]. Figure 2 displays the pre-intervention trend of quarterly energy expenditure rate (continuous line), and the counterfactual scenario (dashed line). Given that most of the points lie above the counterfactual line, there is a visual suggestion of an increase in the energy expenditure in the post-intervention period, which is compatible with a possible negative impact of the conflict.

The Poisson regression model revealed energy expenditure in public healthcare organizations decreased slowly by 0.1% per quarter in the baseline (pre-conflict). Differences were observed across regions, some registered an increasing baseline trend (Abruzzo, 1.3%; Basilicata, 2.4%; A.P Bolzano, 1.5%; Campania, 0.2%; Lazio, 0.2%; Liguria, 2%; Molise, 3%; Sardegna, 2%; Sicilia, 1%; Umbria; 1%). Other regions revealed a slightly decreasing baseline trend (Calabria, -1%; Emilia-Romagna, -1.7%; Friuli-Venezia Giulia, -2%; Marche, -0.1%; Piemonte, -1%; Puglia, -0.1%; Toscana, -1.6%; A.P Trento, -1%; Valle D'aosta, -0.8% and Veneto, -0.2%). All the Italian regions registered an increase in energy expenditure after the conflict, however the increments ranged from 94% of Emilia-Romagna [relative risk (RR) 2.57; 95% confidence interval (CI) 2.570-2.571; P < 0. 001)] to lower increase levels, 50% of Campania [relative risk (RR) 1.66; 95% confidence interval (CI) 1.656-1.657; P < 0. 001)]. Regression analysis and counterfactual graphs for all the regions are available in (Appendix 3).

The controls revealed no over-dispersion and autocorrelation. Specifically, for the over-dispersion, in the analysis this widens the 95% confidence interval marginally to 1.521-2.676, yet there is still very strong evidence of an effect (P < 0.001). The residual plot showed no evidence of autocorrelation.

Further checks on seasonality suggested the association was largely unaffected [relative risk (RR) 2.140; 95% confidence interval (CI) 1.670-2.740; P < 0. 001)]. Figure 3 shows the analysis after adjustment for seasonality through a Fourier term.

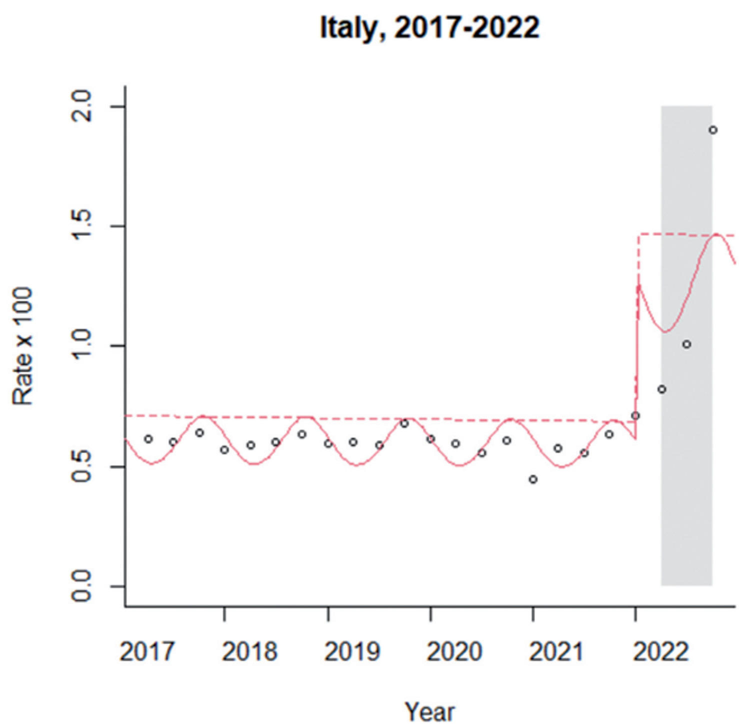

Figure 3 - This figure displays the analysis after adjustment for seasonality through a Fourier term.

Discussion

The Italian healthcare system is increasingly under pressure due to the increasingly elderly population, the high prevalence of chronic diseases, together with the COVID-19 pandemic, has required extraordinary healthcare efforts (29). The Russo-Ukrainian conflict has emerged as another element that could affect the sustainability of international health systems, due to the increase in energy costs and since healthcare organizations are energy-intensive structures (3,4). Therefore, the purpose of this study was to conduct preliminary analyses to measure the effect of the Russo-Ukrainian war on the energy expenditure of public Italian healthcare organizations. Summary statistics and plots revealed that the energy expenditure of public Italian healthcare organizations was stable across the 2017-2021 period, with most regions registering a slightly decreasing pre-conflict trend. Furthermore, Energy expenditure accounted for 1% of healthcare organizations' revenues before the conflict, in line with previous literature that revealed that personnel accounts for most of the total costs, jointly with good and services expenditure (30). Trend plots revealed that the energy expenditure started to increase at the end of 2021, thus showing an anticipation to the beginning of the conflict. This behavior could be referred to as the 'anticipated inflation' phenomenon (31). People's anticipations about the inflation rate matter because actual inflation depends, in part, on what it is expected to be; anticipations influence product and services' price-setting, wage bargaining and spending/saving decisions. All Italian regions registered a notable increase of the energy expenditure rate in public healthcare organizations after the conflict, although inter-regional variability was observed. Variability across regions has been historically observed when observing healthcare systems phenomena, being probably the natural result of a decentralized system (18,32). Regional differences could also be due to the healthcare organization structural characteristics and their geographical location. The energy expenditure of a healthcare organization could be influenced by the healthcare organization's structural characteristics, or the organizational model adopted. Latha et al.(33) highlighted that the layout of a building may have a relevant influence on the environmental energy performance. The 2021 National Recovery and Resilience Plan (PNRR) moved towards this direction, with an investment of over 1.6 billion euros dedicated to adapting old healthcare organization structures to current regulations on construction in seismic areas and energy saving. The energy expenditure increase hit most of the economic sectors. According to data from ARERA, the Regulatory Agency for Energy, Networks and Environment, across the1 April 2021 - 31 March 2022 period, an increase of about 68% was registered for family consumption, reaching an increase in expenditure of about 823 euros for a typical family with an active supply in the protected market (34). The Italian government has introduced several decrees to support families and enterprises, through several instruments as for example tax credit increases especially for high consuming factories. As for families and enterprises, healthcare organization directions require dedicated funds to face cost increases. Indeed, the Government has provided specific temporary funds for the energetic costs increase (35), however structural financial manoeuvres are needed to guarantee healthcare organizations' long term sustainability. The topic of healthcare organization sustainability has largely been discussed in Italy, and several policies have been implemented by the central government to avoid default risk. Although regional governments are in charge of the financial-economic equilibrium of healthcare organizations, several interventions in the last 15 years have been carried out by central authorities to ensure the provision of essential healthcare services, as well as financial and economic stability, the so-called 'Recovery plans' (30). The adoption of recovery plans turned out to be successful in reducing costs, however with no gains in efficiency estimated. The cost reduction resulted in reduced hospitalizations and in some cases even in a mortality increase (36). Energy expenditure increases should be analyzed and monitored by the authorities to avoid undermining the sustainability of the public health system and possibly having to reduce the health services offered as cost-cutting results. Indeed, Tsagkaris et al. highlighted that electricity shortages can lead to unfortunate incidents and hazardous behaviors. For example, electricity cuts could lead to cuts in operating rooms availability, thus increasing waiting lists and limit the continuity of interventions. Electricity cutting could also influence healthcare professionals that are extremely exposed to power blackouts. Indeed, the unavailability of electricity power can cause healthcare workers stress, both physical and psychological, as they are required to manage critically ill patients without the fundamental electronic equipment (37). This dynamic is especially harmful in the post-pandemic era since healthcare personnel have already experienced stressful situations, and worldwide healthcare systems have been exposed to high economic pressures. Further studies should be conducted to analyze the phenomenon in other European countries. Indeed, the uptake of pan-European actions could contrast the healthcare organizations' energy expenditure' increase and guarantee proper universal healthcare assistance.This study presents several limitations. The foremost of which concerns the availability of data per quarter. Lopez Bernal et al. (23) presented monthly datasets for the evaluation of public healthcare interventions. Indeed, Zhang et al. (38) conducted simulations and realized that studies with few time points or with small, expected effect sizes should be interpreted with caution since they may be underpowered. The powers' model increases with the number of time points, even though a high number of points could also not be preferable in the case of historical paths that have significantly changed substantially as this could not give a clear picture of the existent underlying trends. Quarterly data could also affect seasonality since monthly changes could not be observed. However, several ITS analysis on healthcare dataset were successfully conducted on quarterly data (39). Administrative data (also known as claims data or secondary data) are data collected for non-research purposes (often for billing purposes), thus they may be missing particular data points or may not be perfectly up to date. Indeed, the Italian Ministry of Health and the Ministry of Economy and Finances requires continous data revisions and updates. Furthermore, this analysis considered only public healthcare organizations, and not private ones that play an increasingly important role in the Italian healthcare sector.

The study was carried out as of potential interest by considering the pandemic scenario, different research could be of interests and other results could occur in a different time period. Studies considering all healthcare organizations could enhance the evaluation of the impact of the conflict on the energy expenditure and even identify differences considering their structure and organization.

Conclusions

This analysis showed the conflict generated a significant energy expenditure increase in public healthcare organizations across all the Italian regions, reporting a preliminary worrying trend for the sustainability of public healthcare organizations. While such an increase could be considered not that relevant, since energy expenditure accounts for a small part of the revenues, it is important given the historical Italian healthcare organizations' sustainability issues. These preliminary findings suggest most healthcare organizations in Italy could not be able to offer essential levels of care due to cost-cutting as occurred in the past. Several interventions have been carried out to support families and enterprises in managing energy expenditure increases, thus revealing potential actions that have been transferred also to the healthcare sector. As broader interventions, Italy should start thinking in investing in new energy sources that would allow the country to be less energy dependent on other countries and to external phenomena such as conflict. Furthermore, national strategies and investments should be set-up to realize energy-efficient healthcare organizations, together with healthcare prevention actions. Indeed, co-benefit policies, that provide for the convergence of climate change mitigation and disease prevention policies, have been shown to lead to major economic benefits.

Acknowledges

The author acknowledges Agenas and its colleagues for their constant support and useful comments.

Riassunto

L'impatto del conflitto Russo-Ucraino sulla spesa energetica delle aziende sanitarie pubbliche italiane – Un'analisi ITS (Interrupt time-serie)

Introduzione. Le organizzazioni sanitarie sono sistemi complessi caratterizzati da strutture ad alta intensità energetica. Le organizzazioni sanitarie italiane sono sempre più sotto pressione a causa della dipendenza energetica esterna, soprattutto a seguito del conflitto russo-ucraino. La guerra in corso, infatti, ha generato una bassa disponibilità di energia e un'impennata dei costi energetici, portando così all'obiettivo dello studio che è quello di misurare l'effetto della guerra sulla spesa energetica delle aziende sanitarie pubbliche italiane.

Disegno dello studio e metodi. Nel periodo 2017-2022 è stata condotta un'analisi delle serie temporali interrotte. L analisi è stata condotta per le diciannove regioni e le due province autonome italiane. L'outcome utilizzato è stato l'importo della spesa energetica delle le organizzazioni sanitarie pubbliche, congiuntamente a un modello di regressione di Poisson. I ricavi delle organizzazioni sanitarie pubbliche sono stati inclusi come variabile offset per convertire il risultato in un tasso e adeguarsi a eventuali variazioni dei ricavi nel tempo.

Risultati. Il modello ha messo in evidenza un aumento della spesa energetica delle organizzazioni sanitarie pubbliche a seguito del conflitto, con un aumento del 56% [rischio relativo (RR) 1,75] in Italia. Tutte le regioni italiane hanno registrato un notevole incremento del costo energetico, nonostante sia stata osservata una variabilità interregionale.

Conclusioni. Diversi interventi sono stati realizzati per supportare le imprese e le organizzazioni sanitarie nella gestione degli aumenti della spesa energetica, anche se dovrebbero essere messe in atto strategie e investimenti nazionali per garantire la sostenibilità delle organizzazioni sanitarie pubbliche nel lungo periodo.

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Appendixes

Appendix 1

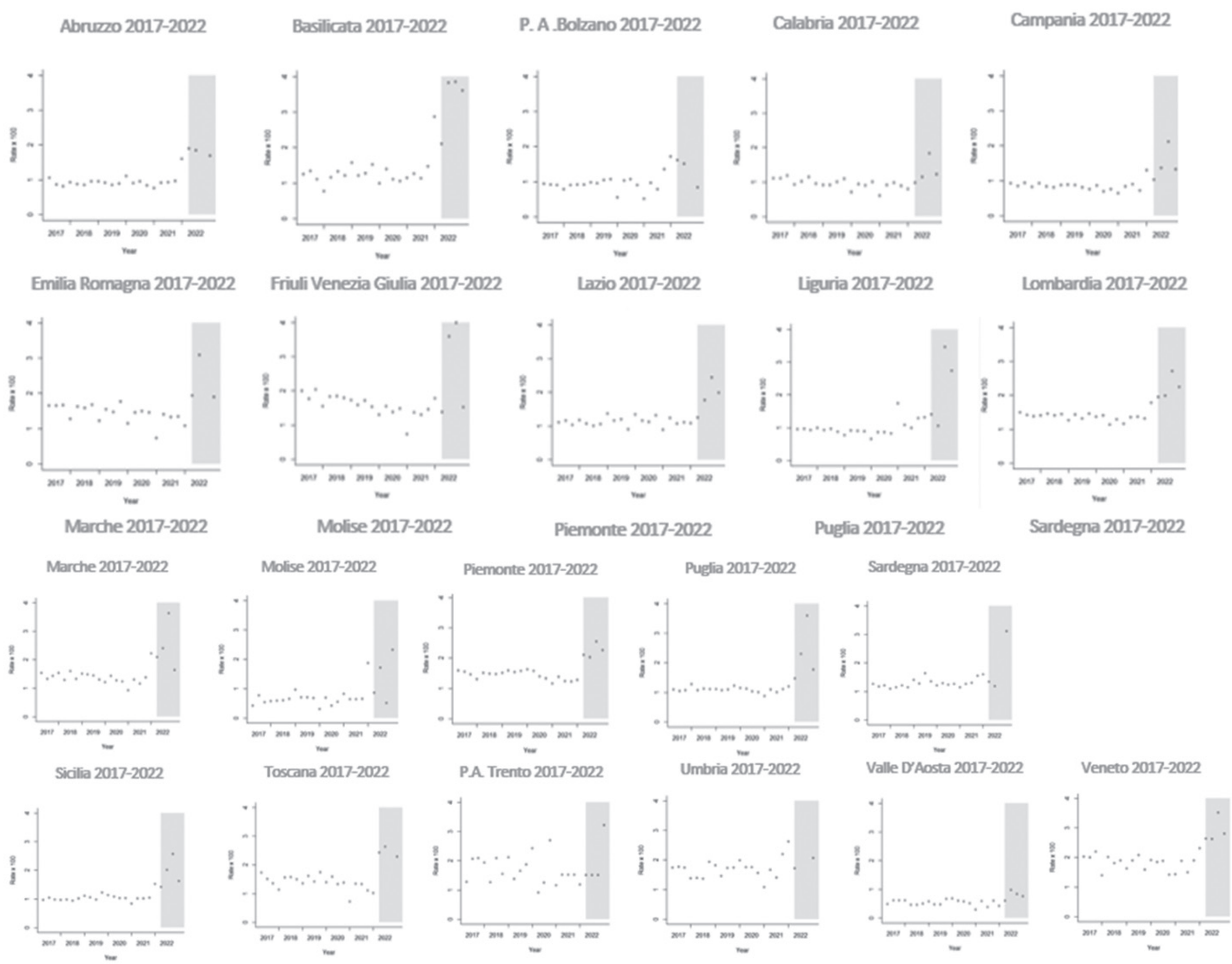
The chosen segmented regression model is:

$$Y_t = \beta_0 + \beta_1 T + \beta_2 X_t + \beta_3 TX_t$$

where Y_t is the energy expenditure in quarter t and time is a continuous variable reflecting time from the start of the observation period in quarters. Intervention (hereafter=conflict) takes value 0 before the conflict and 1 after the conflict started, and time after intervention is a continuous variable indicating time after the reform in quarters. β_0 is the baseline level at T=0, β_1 can be regarded as the change in outcome due to a time unit increase (representing the underlying pre-conflict trend), β_2 is the level change after the conflict and β_3 is the slope change after the conflict (using the interaction between time and intervention: TXt).

Appendix 2

Scatterplot of the time series showing the energy expenditure rate across Italian regions and Autonomous provinces in the period 2017-2021.



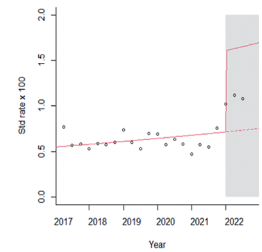
Appendix 3

The Poisson regression model and counterfactual graphs for all the Italian regions

Abruzzo

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.202	0	22637.611	0	0.006	0.006	0.006
War	0.809	0	2874.674	0	2.247	2.245	2.248
Time	0.013	0	718.862	0	1.013	1.013	1.013

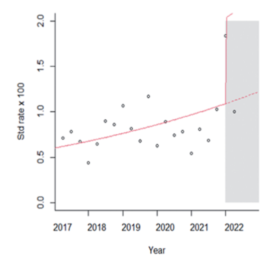
Abruzzo 2017-2022



Basilicata

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.113	0	-16299.370	0	0.006	0.006	0.006
War	0.623	0	1721.057	0	1.864	1.862	1.865
Time	0.030	0	1229.485	0	1.030	1.030	1.030

Basilicata 2017-2022



A.P Bolzano

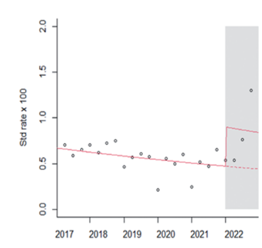
	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.254	0	-16155.072	0	0.005	0.005	0.005
War	0.877	0	2444.701	0	2.404	2.402	2.404
Time	0.022	0	895.118	0	1.023	1.023	1.023

A.P Bolzano 2017-2022

Calabria

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.002	0	-262111.791	0	0.007	0.007	0.007
War	0.643	0	2206.019	0	1.902	1.901	1.903
Time	-0.017	0	-1068.980	0	0.983	0.983	0.983

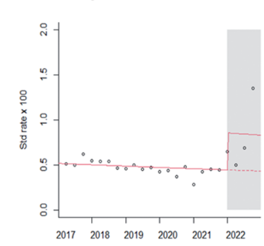
Calabria 2017-2022



Campania

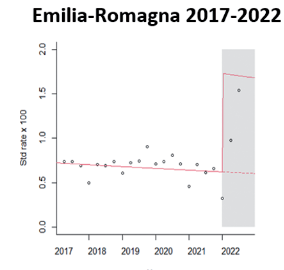
	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.264	0	-42156.478	0	0.005	0.005	0.005
War	0.655	0	3700.306	0	1.925	1.924	1.926
Time	-0.008	0	-730.147	0	0.992	0.992	0.992

Campania 2017-2022



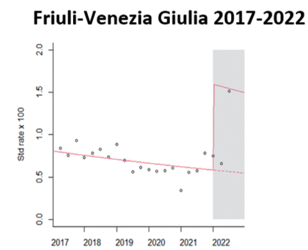
Emilia-Romagna

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-4.927	0	-44075.274	0	0.007	0.007	0.007
War	1.021	0	6953.135	0	2.777	2.776	2.778
Time	-0.008	0	-816.898	0	0.992	0.992	0.992



Friuli-Venezia Giulia

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-4.818	0	-23.108.741	0	0.008	0.008	0.008
War	1.004	0	3470.483	0	2.730	2.728	2.731
Time	-0.016	0	-921.313	0	0.984	0.984	0.984

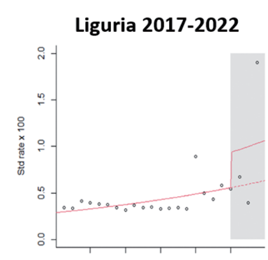


Lazio

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.232	0	-45813.677	0	0.005	0.005	0.005
War	0.541	0	3531.671	0	1.719	1.718	1.719
Time	0.006	0	650.865	0	1.006	1.006	1.006

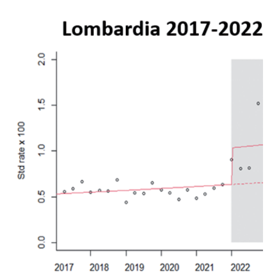
Liguria

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.844	0	-22199.011	0	0.003	0.003	0.003
War	0.517	0	1711.271	0	1.677	1.676	1.678
Time	0.033	0	1637.479	0	1.033	1.033	1.033



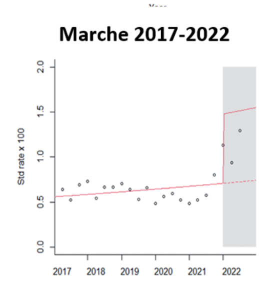
Lombardia

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.237	0	-61142.892	0	0.005	0.005	0.005
War	0.488	0	4307.434	0	1.628	1.628	1.629
Time	0.009	0	1300.839	0	1.009	1.009	1.009



Marche

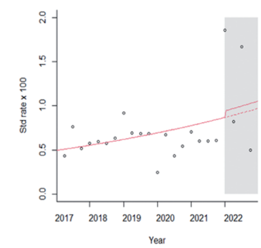
	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.817	0	-24410.070	0	0.006	0.006	0.006
War	0.735	0	2776.962	0	2.086	2.085	2.087
Time	0.012	0	702.739	0	1.012	1.012	1.012



Molise

	Estimate	StdErr	z	P exp (Est.)		2.5%	97.5%
(Intercept)	-5.307	0	-11814.771	0	0.005	0.005	0.005
War	0.082	0	136.756	0	1.085	1.084	1.086
Time	0.028	0	807.812	0	1.029	1.028	1.029

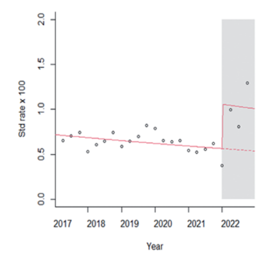
Molise 2017-2022



Piemonte

	Estimate	StdErr	z	P exp (Est.)		2.5%	97.5%
(Intercept)	-4.933	0	-41579.916	0	0.007	0.007	0.007
War	0.627	0	3591.985	0	1.871	1.871	1.872
Time	-0.012	0	-1216.017	0	0.988	0.988	0.988

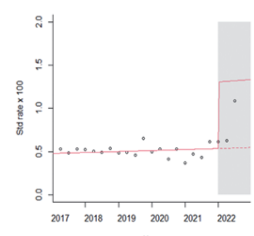
Piemonte 2017-2022



Puglia

	Estimate	StdErr	z	P exp (Est.)		2.5%	97.5%
(Intercept)	-5.339	0	-36212.518	0	0.005	0.005	0.005
War	0.890	0	4809.001	0	2.435	2.434	2.436
Time	0.006	0	464.395	0	1.006	1.006	1.006

Puglia 2017-2022



Sardegna

	Estimate	StdErr	z	P exp (Est.)		2.5%	97.5%
(Intercept)	-5.020	0	-26167.882	0	0.007	0.007	0.007
War	0.665	0	2700.280	0	1.945	1.944	1.946
Time	0.006	0	381.448	0	1.006	1.006	1.006

Sardegna 2017-2022

Sicilia

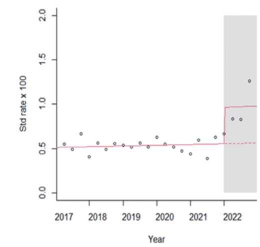
	Estimate	StdErr	z	P exp (Est.)		2.5%	97.5%
(Intercept)	-5.094	0	-44083.165	0	0.006	0.006	0.006
War	0.558	0	3763.989	0	1.748	1.747	1.748
Time	0.012	0	1327.414	0	1.012	1.012	1.012

Sicilia 2017-2022

Toscana

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.271	0	-41383.683	0	0.005	0.005	0.005
War	0.553	0	3258.181	0	1.739	1.739	1.739
Time	0.004	0	374.957	0	1.004	1.004	1.004

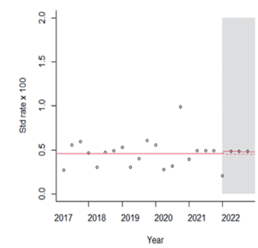
Toscana 2017-2022



A.P Trento

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.376	0	-14155.688	0	0.005	0.005	0.005
War	0.056	0	95.328	0	1.058	1.056	1.059
Time	-0.001	0	-20.307	0	0.999	0.999	0.999

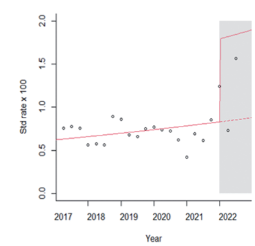
A.P Trento 2017-2022



Umbria

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.079	0	-19729.715	0	0.006	0.006	0.006
War	0.768	0	2429.653	0	2.156	2.155	2.158
Time	0.014	0	704.222	0	1.014	1.014	1.015

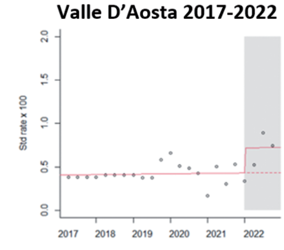
Umbria 2017-2022



Valle D'Aosta

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.503	0	-6567.654	0	0.004	0.004	0.004
War	0.509	0	459.998	0	1.664	1.661	1.668
Time	0.003	0	42.645	0	1.003	1.003	1.003

Valle D'Aosta 2017-2022



Veneto

	Estimate	StdErr	z	P	exp (Est.)	2.5%	97.5%
(Intercept)	-5.271	0	-41383.683	0	0.005	0.005	0.005
War	0.553	0	3258.181	0	1.738	1.738	1.739
Time	0.004	0	374.957	0	1.004	1.004	1.004

Veneto 2017-2022