ERF Policy Brief

Is It Getting Too Hot to Work in the MENA Region?

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In a nutshell

- *Climate change and its expected consequences have been a growing global concern.*
- *The impact of changes in climate indicators on labor supply in the Middle East and North Africa (MENA) region is significant.*
- *It is important to differentiate between "high-risk" groups engaged in economic activities with higher exposure to climate and "low-risk" groups with relatively less exposure to climate.*
- *Changes in temperature and humidity have a noteworthy impact on labor working hours.*
- *Exposure to climate change negatively impacts day-to-day business operations in the MENA region.*
- *Adapting to global warming is costly but indispensable.*
- *Social dialogue is important to educate citizens on working conditions on a warming planet.*

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This policy brief assesses the impact of climate change on the Middle East and North Africa (MENA) labor markets, with a focus on labor supply. Geographically gridded daily measures of meteorological variables are matched to the Integrated Labor Market Panel Survey (ILMPS) data, focusing on three weather variables: maximum temperature, precipitation, and relative humidity. All the rounds of ILMPS in which the interview date was present have been used, particularly for Egypt in years 2006, 2012, and 2018, Jordan 2016, and Tunisia, 2014. Thereby, this policy brief discusses the results of a study investigating data on hours of labor together with climate for three countries of the MENA region: Egypt, Tunisia, and Jordan. It began by examining the impact of climate change in MENA. Then, it looked into how climate change impact labor productivity in general. Subsequently, the impact of climate change on MENA's labor productivity is investigated using ILMPS and climate data.

Climate change and labor productivity in MENA

MENA is considered among the world's most vulnerable regions to climate change. This is due to the fact that negative impacts in the region are exacerbated by already existing challenges such as high population density, poverty, poor nutrition and inequality. A first step to informing policy on climate change adaptation is by assessing and understanding climate change consequences, risks and opportunities. Literature on the influence of climate change in MENA covers various aspects of human systems such as migration, topography and agriculture. Yet, panel estimates on the repercussions of labor productivity and availability are of interest to better understand the short- term impacts of climate change and the relationship between weather aspects, labor and economic outcomes.

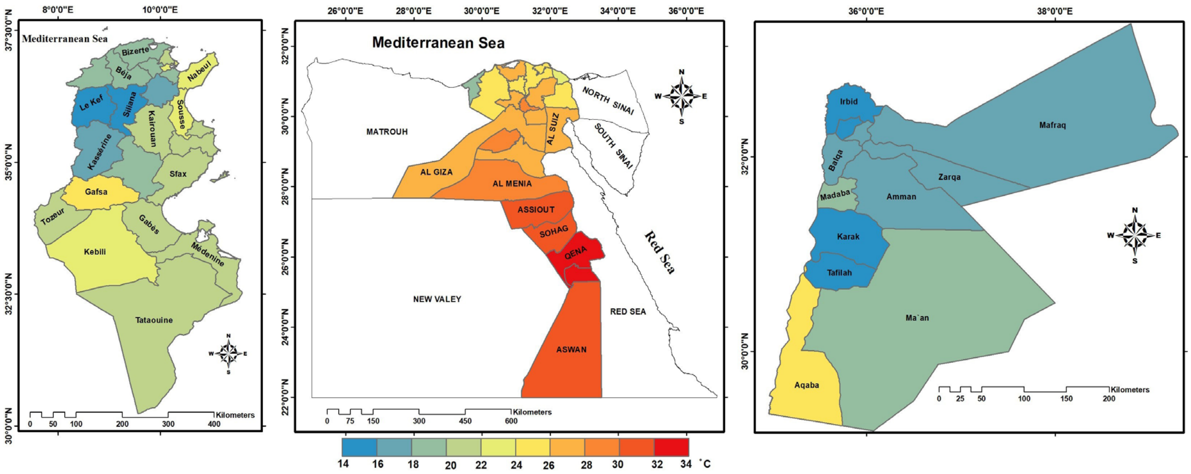
Changes in labor productivity due to climate change has been a subject of research by many scholars. Hot weather induces heat stress for workers, both in indoor and outdoor work environments, especially where thermal environments cannot be properly controlled, leading to reduced working hours due to frequent breaks and other adaptive measures. Furthermore, impacts of rising temperature on economic productivity are heterogenous between poor and rich countries. Poor countries suffer negative effects of rising temperature in agricultural, industrial output and investment. On the other hand, estimates for wealthier countries are smaller, albeit insignificant. A sectoral investigation on rising temperature impacts show reduction in workers availability in industries with high exposure to climate such as farming, construction, and other outdoor activities. More broadly, labor productivity is negatively affected in industries that are climate-exposed, where temperature rises beyond a certain threshold. Studies have concluded that a non-linear relation- ship exists between economic productivity and temperature. Despite the extensive literature on the negative effects of climate change on agricultural outcomes and economic growth, only a handful of studies examines the impact of climate change on labor supply.

Typically, weather conditions vary from one location to another. Figure 1 depicts the weekly average of the maximum temperature per governorate in Tunisia, Egypt and Jordan. The average maximum temperature ranges between 9 and 44 °C. This is very alarming to the MENA countries. Earlier studies have noted previously that reduced labor productivity is associated with temperatures above 24–26°C and 50 percent of the work capacity can be lost at 33–34°C for a worker operating at moderate work intensity. Therefore, in some areas of the MENA countries, work capacity will be diminished by half.

When it comes to work time, Figure 1 shows the weekly average number of work hours in each governorate of the above mentioned countries. Based on our sample, the number of hours worked per week ranges from 1 to 140 with an average of 46 work hours per week.

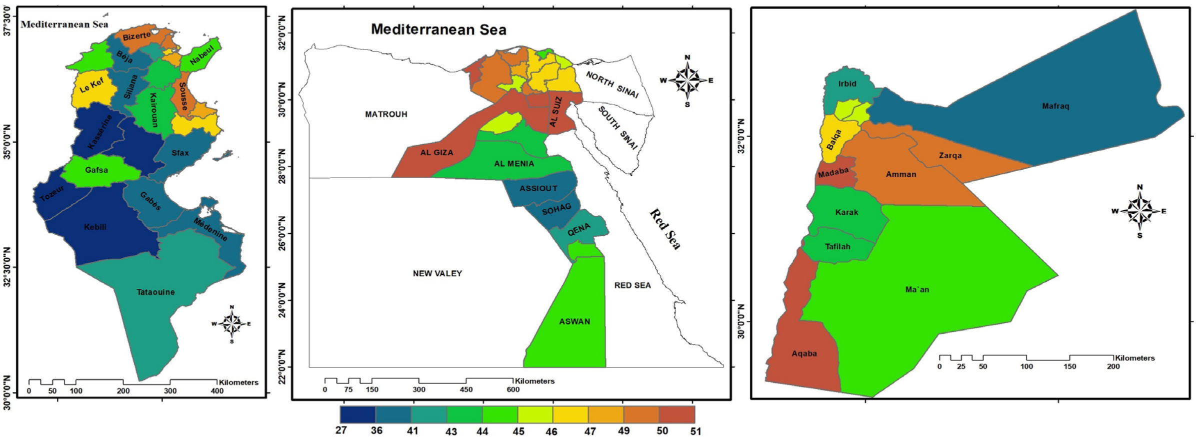
Generally speaking, an individual's time is allocated between working and non-working activities. During summer time, as weather temperature rises, the marginal utility of working decreases and individuals reallocate their time more towards non-working activities. In other words, workers are expected to work less. Yet the impact of an increase in temperature is non-linear because at relatively cooler weather, an increase in temperature results in higher marginal utility of working; resulting in allocating more time towards working activities. Figure 2 maps risk zones for MENA countries where the shaded areas represent governorates with weather conditions exceeding weekly average maximum temperature, relative humidity and working hours. Governorates are identified as risk zones according to their vulnerability to climate impacts. The figure shows that some Mediterranean coastal governorates, namely Damietta and Port Said in Egypt and Nabeula, Sousse and Tunis in Tunisia in addition to Madaba in Jordan that is located by the Dead Sea, are particularly vulnerable and experiencing more climate related risks than other governorates in their respective countries. Some of the potential risks that are expected to be associated with climate change include land loss, reduction in crop yield, population displacement, and job loss. In addition to risks of sea level rise, labor productivity and health are at risk of thermal discomfort due to heat extremes.

Figure 1: Weekly average of the maximum temperature per governorate



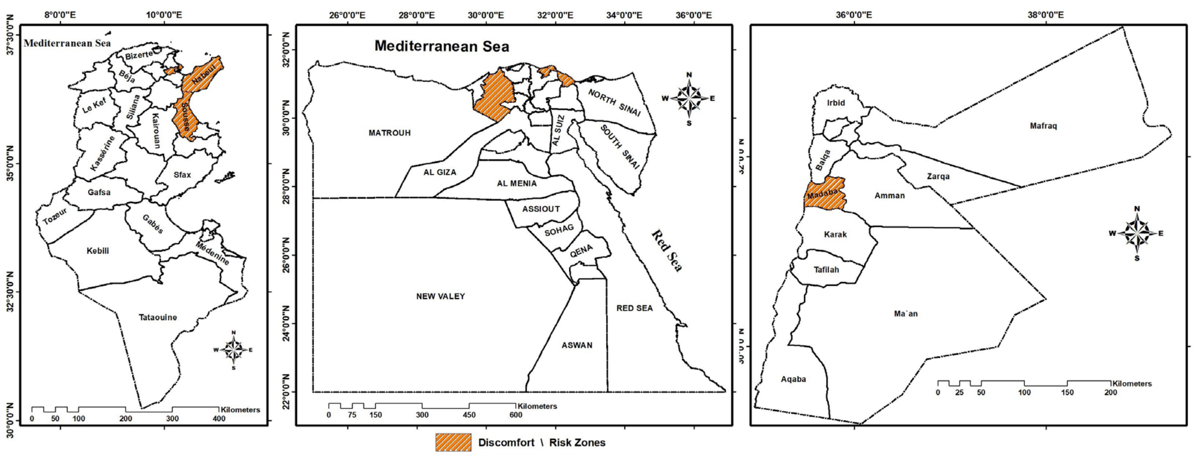
Source: Authors' graph using NOAA CPC Global daily temperature

Figure 2: Weekly average number of hours worked per governorate



Source: Authors' graph using ILMPS

Figure 3: MENA countries' risk zones



Source: Authors' graph using NOAA CPC Global and NASA POWER

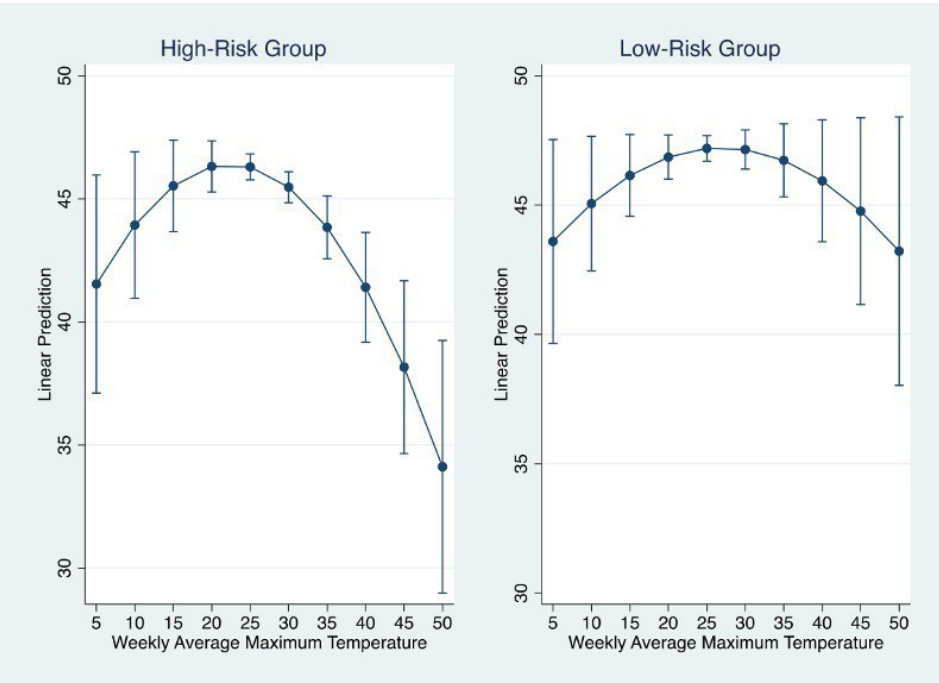
Climate change and MENA risk groups

Comparing the high-risk group to the low-risk group revealed that the work hours for both groups are significantly impacted by weather temperature. As weather temperature rises, the number of working hours increase but at a diminishing rate, following a quadratic relationship with the high-risk group being relatively more sensitive to temperature changes than the low-risk group. After controlling for the other climate variables, demographic and socioeconomic indicators, the temperatures at which work hours for the high-risk group and the low-risk group reach their maximum are 22°C and 26°C, respectively. Moreover, there is a steeper decline in the number of work hours in the high-risk group as temperature rises. In other words, as expected, the impact of climate variability appears to be stronger for groups with higher exposure such as agriculture, mining, etc. in comparison to occupations with lower exposure to climate.

Figure 4 provides evidence that, on average, the relationship between weekly average maximum temperature and the number of work hours is positive but at a diminishing rate. This indicates that the relationship is quadratic. On the other hand, the relationship is significant and negative between the number of working hours and weekly average humidity. In other words, higher humidity is associated with a reduction in weekly working hours. Yet, precipitation does not show any significant robust relationship with the hours of work.

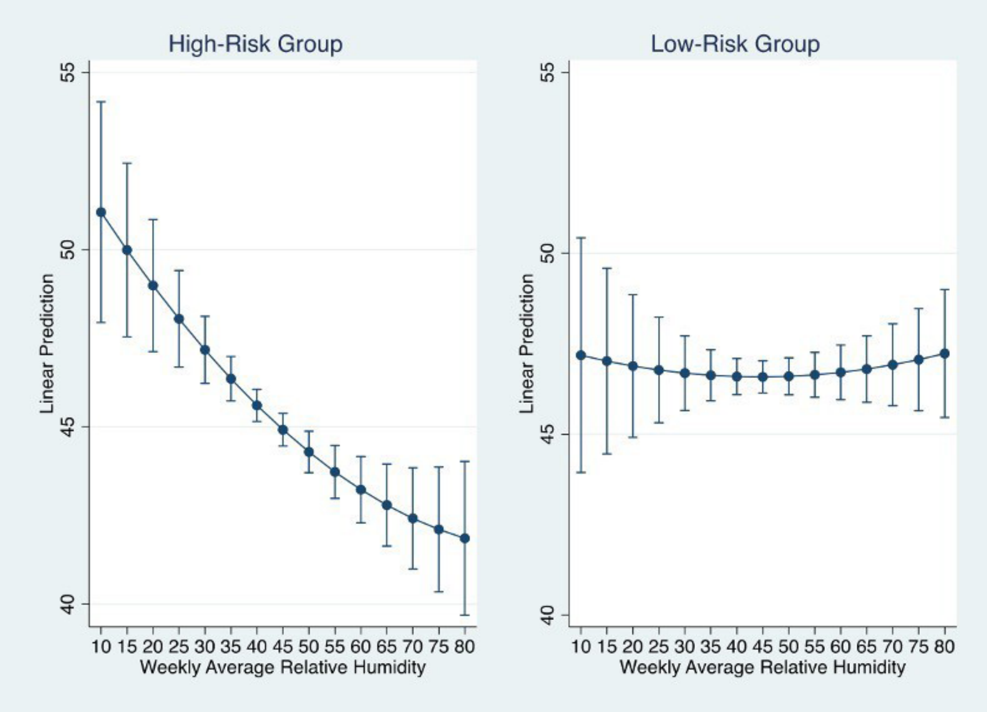
Examining the impact of humidity on labor working hours, after controlling for the other climate indicators, revealed a significant impact of humidity on the high-risk groups but not on the low-risk groups (Figure 5). Furthermore, after controlling for temperature and humidity, precipitation has no significant impact on labor working hours for both high- and low-risk groups.

Figure 4: Predicted margins (95% confidence interval) – weekly average maximum temperature and work hours



Source: Authors' graphs

Figure 5: Predicted margins (95% confidence interval) – weekly average humidity and work hours



Source: Authors' graphs

Conclusion

Climate change does not only impact the environment, but also impacts societies' social and economic dimensions. This provokes significant research interest towards identifying the consequences of climate change on economic outcomes including economic growth and productivity. There is an emerging literature studying climate change impacts on economic activities using panel methodologies and appropriate weather data, such as temperature, precipitation and windstorms within a given spatial area. Sources of weather data that are used in econometric analyses can be derived from ground stations or gridded satellite data in the case of poor ground coverage, especially in developing countries. This policy brief tackles the impact of changes in climate indicators on individual-level labor supply, measured by the hours of work per week controlling for socioeconomic and demographic aspects, such as age, gender, education and household wealth in the MENA region.

Distinction between the impacts on "low-risk" and "high-risk" labor groups is important for policy making to address climate impacts on labor supply. There is a clear inverse relationship between relative humidity and labor working hours which is observed only in the case of high- risk groups. Given that most of the strategically important activities in the MENA region are considered to be "high-risk" with relatively more exposure to climate, we emphasize the importance of understanding the relationship between changes in climate indicators and labor supply in the region. This calls for serious attention and immediate action from policy makers towards the pressing issues of climate change since this could ultimately have a negative impact on the economy. Exposure to climate change negatively impacts day-to-day business operations in the MENA region. These impacts on businesses and the economy call for structural transformation in high- risk industries such as agriculture. Structural transformation is considered a mitigation strategy for climate change.

The structural transformation is the transition of an economy from low productivity and labor-intensive economic activities to higher productivity and skill-intensive activities. It includes adopting research and development investments, technological diffusion strategies, and public investments to offset these substantial – and ongoing – climate change impacts and pro- mote productivity growth. An example of this is climate-smart agriculture practices. More vital policy measures are needed to enrich information concerning on-site weather status, workwear and equipment adaptation and technological enhancements at the workplace. This will allow workers to cope with higher temperatures and humidity. Adjusting working hours in addition to occupational safety and health measures are needed. Finally, it is important to have social dialogue to educate citizens on the changing conditions on a warming planet.

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