Energy policy and public health: An assessment for Turkey

Prof. Kayıhan Pala
Uludag University Faculty of Medicine Department of Public Health
Advisory Board Member of Turkish Medical Association
kpala@uludag.edu.tr

Energy policies can affect health negative

Energy policies affect health 3 main areas:

1. Community health
   - Disorders
   - Diseases
   - Injuries/disabilities
   - Premature deaths
2. Occupational health & safety
3. Climate change

The health of society is affected by the pollution caused by energy production/consumption:

- Air pollution
- Water pollution
- Soil pollution
- Noise pollution
- Electromagnetic fields

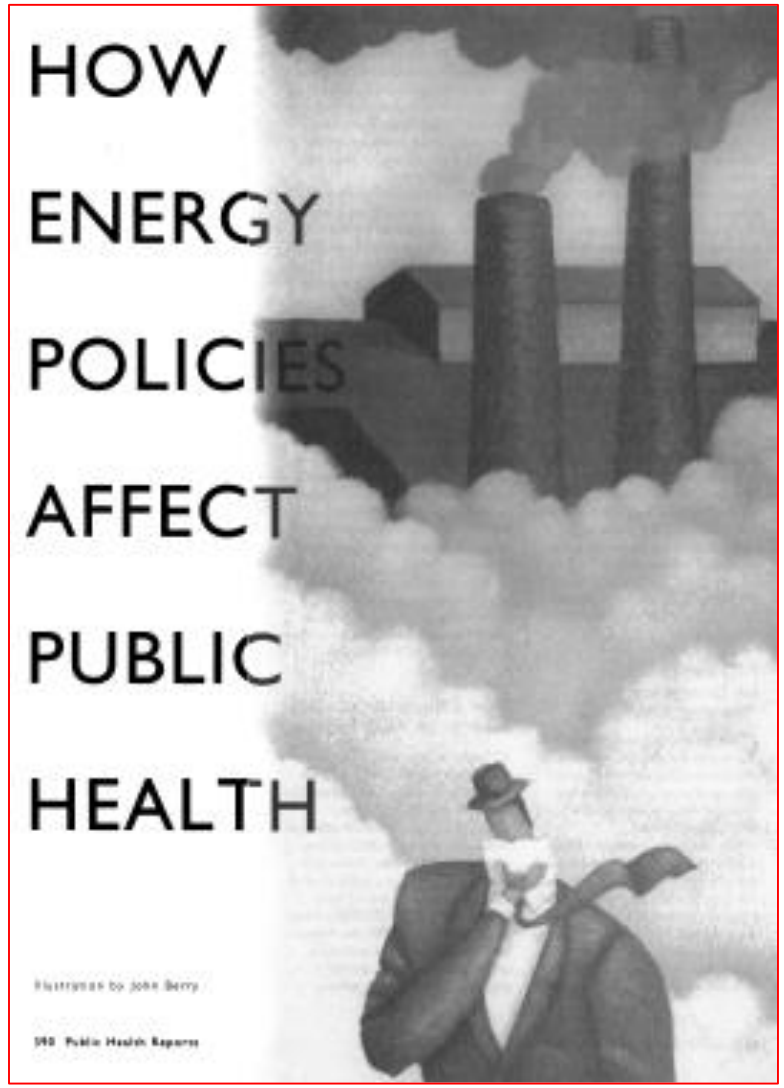
Scientists have been warning society about the health effects of energy policies for decades

Energy Policies' Effect on Health

Joseph J. Romm, PhD
Christine A. Ervin, MS

September/October 1996 • Volume 111

THE CONNECTION BETWEEN energy policy and increased levels of respiratory and cardiopulmonary disease has become clearer in the past few years. People living in cities with high levels of pollution have a higher risk of mortality than those living in less polluted cities. The pollutants most directly linked to increased morbidity and mortality include ozone, particulates, carbon monoxide, sulfur dioxide, volatile organic compounds, and oxides of nitrogen.



The Health Impacts of Energy Choices

ENERGY PRODUCTION

- Extraction 
- Transport 
- Processing 
- Construction 
- Generation 
- Distribution 
- Waste disposal 

ENVIRONMENTAL DISRUPTION

- AIR EMISSIONS
- OTHER EMISSIONS (LAND AND WATER)
- WATER CONSUMPTION
- USE OF LAND AND WATERWAYS

Land and water quality and availability

CLIMATE-ACTIVE POLLUTANTS
Carbon dioxide
Black carbon
Methane

HEALTH-DAMAGING POLLUTANTS
Nitrogen oxides
Ground-level ozone
Sulfur oxides
Particulate matter
Mercury
Heavy metals
PAHs

- Employment and livelihoods
- Occupational risks
- Energy access

HEALTH OUTCOMES

Life expectancy
Quality of Life
Physical health
Mental health
Health equity

Source: Health Care Without Harm 2016

A Comparison of the Health Impacts of Energy Choices

Source: Health Care Without Harm 2016

	PUBLIC HEALTH RISKS	OCCUPATIONAL HEALTH RISKS	CLIMATE RISKS
COAL	Mining causes ecological damage, stresses nearby communities, increases risk of mudslides, and contaminates water. Transport causes air pollution, noise, and injuries. Combustion results in significant air pollution including particulate matter, ozone, and mercury. Coal waste contains toxic metals and radioactive materials.	Accidents, silica and coal dust, carcinogens, heat, noise, and vibration.	44% of global CO_2 from fuel combustion; methane; and short-lived pollutants.
OIL	Communities near refineries are exposed to a range of air toxics. Large-scale spills can cause injuries and fatalities, food contamination, and mental health disorders. Combustion yields a range of air pollutants as with coal. Waste may have health effects similar to those of coal waste.	Accidents, chronic musculoskeletal repetitive stress, noise, vibration, airborne hydrocarbons, and carcinogens.	35% of global CO_2 from fuel combustion; methane; and short-lived pollutants.
GAS	**Conventional gas:** Air pollution from power plant operations. **Unconventional gas:** Hydraulic fracturing is highly water intensive and can contaminate water. Communities near production sites could also be exposed to air pollution, seismic activity, and radioactivity.	Varies by drilling method; includes accidents, air borne particulates, carcinogens, and pulmonary asthmagens and irritants.	20% of global CO_2 from fuel combustion; methane; and short-lived pollutants.
NUCLEAR	Each step in nuclear energy production leads to radioactive and chemical emissions and waste streams, which carry a low risk of water contamination and cancer in nearby communities. Accidents are rare but result in highly damaging radiation exposure.	Accidents, heat stress, leaks causing airborne carcinogens including ionizing radiation, and psychological stress.	Minor climate impact from construction and mining-related land use changes.
BIOFUELS	Combustion creates less air pollution compared to fossil fuels. Diversion of farmland can threaten nutrition and food security. Depending on the feedstock, biofuel production may result in land use changes, high water consumption, water contamination, and ecological damage.	Injuries, ultraviolet radiation, exposure to dust and other toxins, and other risks from commercial forestry.	Climate benefit from reduced combustion emissions may be negated by fossil fuel inputs, land use changes, and other factors.
HYDROELECTRIC	**Large hydro:** Construction can displace vulnerable populations. Alteration of local hydrology may increase risk of infectious diseases. Dam failures can be catastrophic to downstream communities. **Small hydro:** Public health risks are not well-documented but assumed to be minimal.	Toxic chemical exposures, diesel fumes, drowning, electrocution, noise, and other hazards involved in construction and operation, primarily for large dams.	Variable climate impact from construction and operation, including significant emissions from reservoirs.
GEOTHERMAL	Relatively low public health risks from air pollution, water contamination, water use, and land use in modern systems with appropriate controls. Some systems generate air pollutants and hazardous waste.	Injuries, silicosis, noise, and toxic chemical exposures.	Minor climate impact from construction and operation. Open-loop systems emit relatively small amounts of CO_2 and methane.
SOLAR	Public health risks are likely far lower than that of any fossil fuel, as there are no emissions during operation and no routine waste stream. Health concerns center around the management of toxic materials during manufacturing and end-of-life disposal.	Hazards typical of manufacturing industries, including injuries, noise, and toxic chemical exposures.	Minor climate impact from equipment manufacture.
WIND	Public health risks are likely far lower than that of any fossil fuel, as there are no emissions during operation and no routine waste stream. Health concerns center on noise from moving gear trains and turbine blades, which can disturb sleep or contribute to stress related disorders.	Hazards typical of manufacturing industries, including injuries, noise, and toxic chemical exposures.	Minor climate impact from equipment manufacture.

COLOR GUIDE — most harmful to health; phase-out and strong protections advised — less harmful to health; caution and protections advised — minimally harmful to health, but protections for affected populations advised

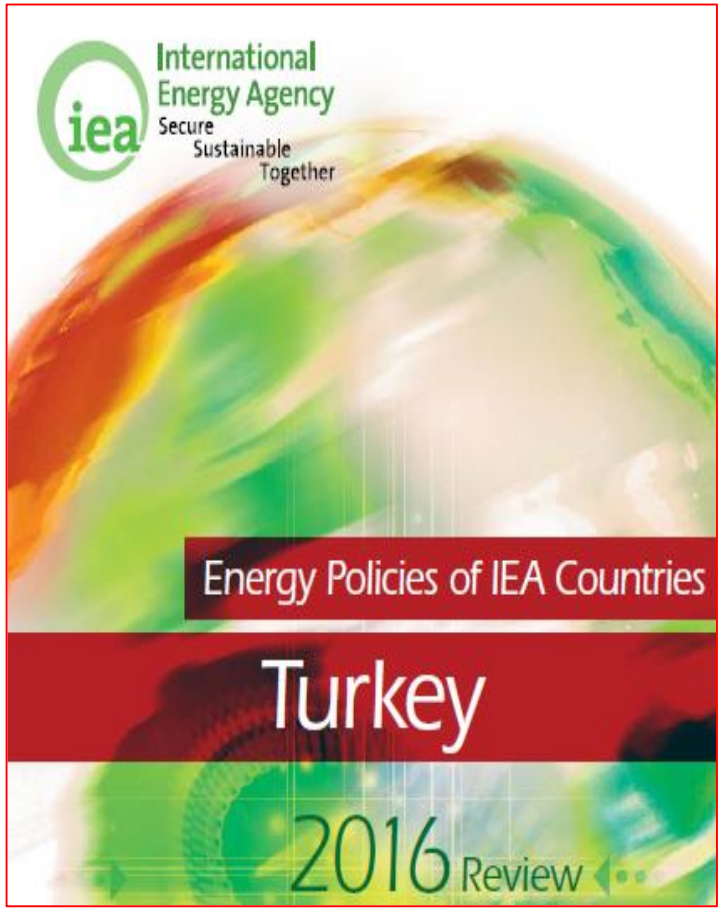
HEALTHY ENERGY INITIATIVE | A program of Health Care Without Harm | www.healthyenergyinitiative.org | July 2016

Most harmful to health

Turkey's key energy policy objectives (2014-2018)

Turkey bases policy actions in the energy sector on five-year economic development and strategic sectoral plans to guide investments and government actions across several ministries. In 2013, the government set out the key energy policy objectives in the **10th National Development Plan (2014-18)** (published in the *Official Gazette No. 28699*) which include ambitions to:

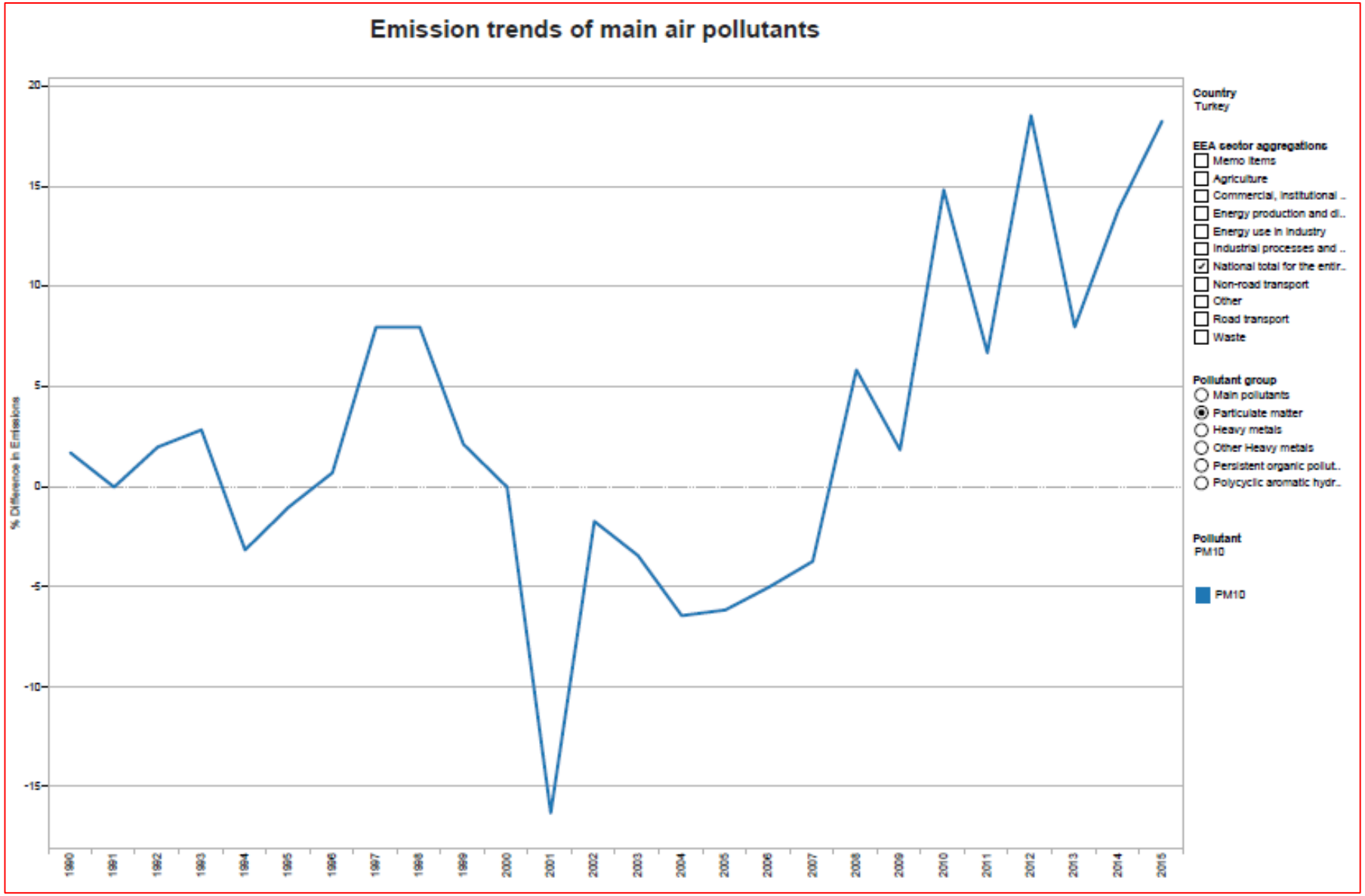
- increase domestic supply sources
- decrease import dependence
- diversify supply sources and routes
- realise oil and natural gas pipeline projects
- increase energy efficiency and renewable energy
- decrease consumption of fossil fuels
- improve competitiveness on electricity and natural gas markets
- expand and construct natural gas storage facilities and
- start up the operation of nuclear power plants.



10th National Development Plan (2014-2018):

- «Domestic coal resources will be transformed into electricity by the private sector.»
- «Exploration activities to determine the potential of lignite coal will be maximized.»
- «It is targeted that the production of lignite-based energy will be increased to 60 billion kWh by 2018 from 39 billion kWh in 2012»
- «The coal reserves will be increased by accelerating the search for it.»

- **National energy strategy aims to increase the usage of coal.**
- This strategy ignores 3 important issues related to public health:
  - Health issues (Disease, premature death etc.)
  - Occupational health and safety
  - Climate changes



PM emissions in Turkey are rising rapidly

European Environment Agency, https://www.eea.europa.eu/data-and-maps/dashboards/air-pollutant-emissions-data-viewer

Air pollution is a big problem around industrial zone in Turkey.

Air Qual Atmos Health
DOI 10.1007/s11869-010-0129-9

Airborne particulate matter ($PM_{2.5}$ and PM_{10}) and associated metals in urban Turkey

Michaela Kendall · Kayihan Pala · Sumru Ucakli · Seref Gucer

Received: 19 November 2009 / Accepted: 28 December 2010

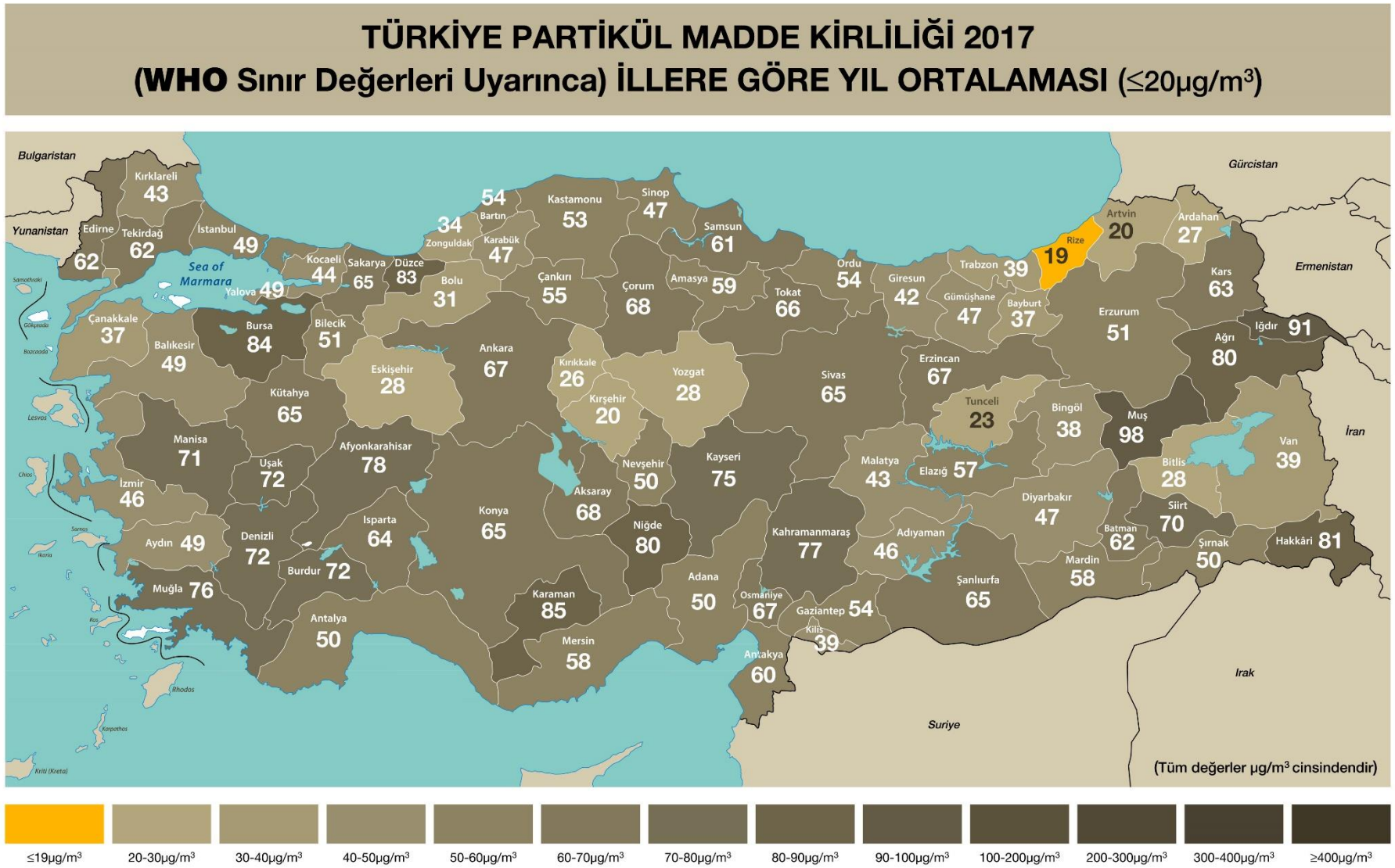
Abstract Airborne particulate matter (PM) and associated metals were measured in a district of an industrial city in Western Turkey. We compared PM concentrations in Bursa, Turkey (Nilufer district) with international air quality standards. Turkish legislature adopted the EC Air Quality Framework in 2008, and compliance is required in the medium term. State-of-the-art reference methods were used for all measurements. A Partisol sampler measured urban background $PM_{2.5}$ and PM_{10} between May 2007 and April 2008, and $PM_{2.5}$ samples were later analysed for selected metals using ICP-MS. Average $PM_{2.5}$ and PM_{10} mass concentrations over the year were 53 and 83 $\mu g/m^3$, respectively. The annual mean $PM_{2.5}$:PM_{10} ratio in Bursa was 0.64. $PM_{2.5}$ and PM_{10} were highly correlated at the site (R=0.91 overall), especially in winter. In the cold seasons, the coarse and fine fractions were strongly correlated R=0.67 (p<0.1), while in the warm seasons, they were not (R=0.01). Sampler results correlated well with a nearby Government sampler. Current PM_{10} and $PM_{2.5}$ levels in Bursa breach current and prospective EU air quality standards, with significant implications in public health.

Keywords Air pollution · Particulate matter (PM) · $PM_{2.5}$ · PM_{10} · Particulate-associated metals · Turkey · Public health

Electronic supplementary material The online version of this article (doi:10.1007/s11869-010-0129-9) contains supplementary material, which is available to authorized users.

M. Kendall (✉)
European Centre for Environment and Human Health (ECEHH),
Peninsula College of Medicine and Dentistry,
University of Exeter,
The Knowledge Spa,
Cornwall, Truro, UK TR1 3HD
e-mail: michaela_kendall@yahoo.co.uk

M. Kendall
e-mail: m.kendall@ex.ac.uk



Bu raporda (01.11.2016-31.10.2017) tarihleri periyodik referans alınarak illerin PM10 ölçüm sonuçları incelenmiştir.
Sonuçlar T.C. Çevre ve Şehircilik Bakanlığı hava kalitesi izleme istasyonları web sitesinde (http://www.havaizleme.gov.tr/Default.ltr.aspx) yer alan MultiStationReport bölümünde PM10 için 24 saatlik ortalamalar kullanılarak analiz edilmiştir.

Türk Toraks Derneği

In Turkey, the annual mean of PM10 level is higher than WHO's limit value in all cities except Rize (01.11.2017-30.10.2017).

Evaluation of Respiratory Functions of Residents Around the Orhaneli Thermal Power Plant in Turkey

Asia-Pacific Journal of Public Health
24(1) 48–57

DOI: 10.1177/1010539510363622
http://aph.sagepub.com
SAGE

Kayihan Pala, MD, PhD,[1] Alpaslan Türkkan, MD, PhD,[1] Harika Gerçek, MD, PhD,[1] Erdinc Osman, MD,[2] and Hamdi Aytekin, MD[1]

Abstract

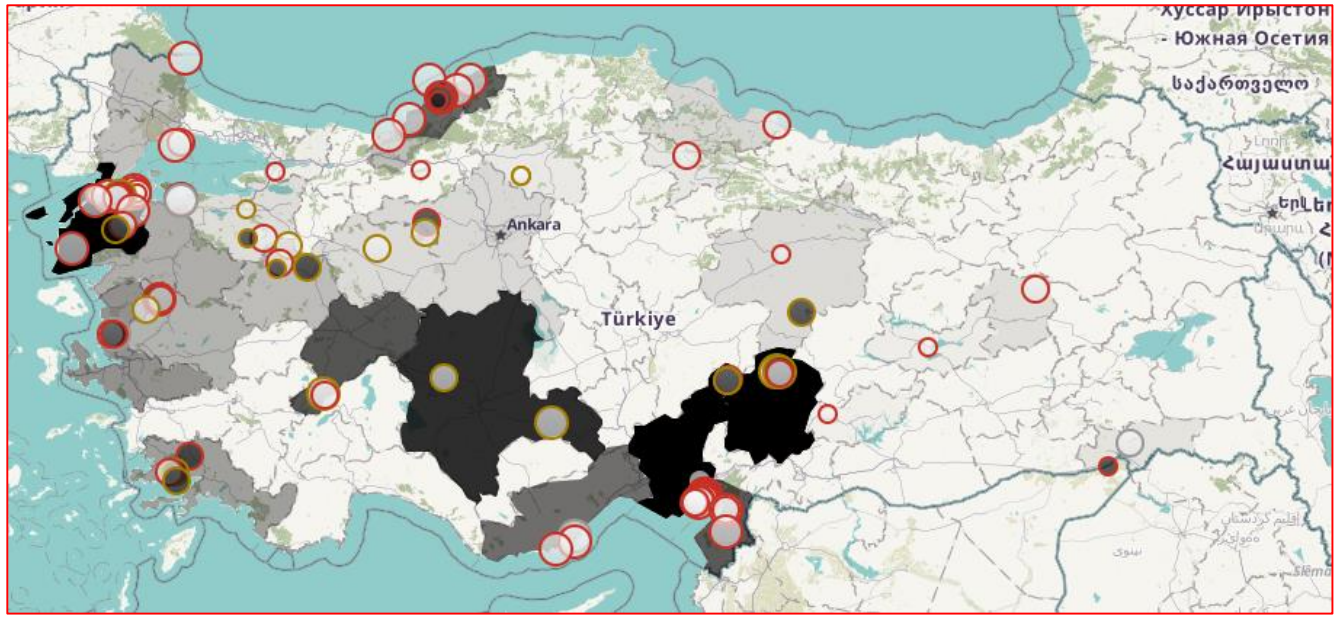
The aim of this cross-sectional study was to evaluate the health and respiratory function of residents around the Orhaneli thermal power plant in Turkey. The study was conducted using face-to-face interviews, and respiratory functions were measured with a spirometer. The respiratory functions of 2350 residents, 15 years and older, living in communities near the coal-fired Orhaneli thermal power plant in Turkey were measured. The control group consisted of 469 persons from similar communities without a nearby power plant. The FEV1 (forced expiratory volume after 1 s) and FVC (forced vital capacity) values of the study participants were significantly lower than those of the control group, and residents directly downwind of the plant's smokestack showed greater impairment of respiratory functions compared with residents upwind.

People who live near coal-fired power plants have health risks from power plant pollution.

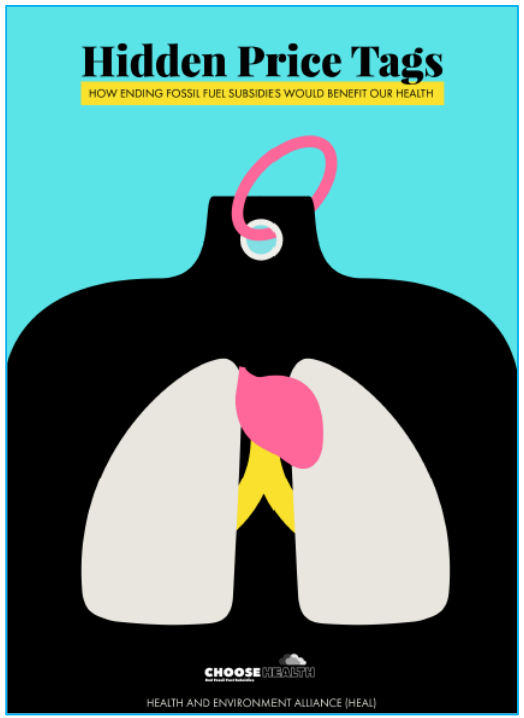
«Respiratory functions of study participants were significantly lower than those of the control group who live 30 km away from plant»

Ministry of Health:
«It has been determined that there is a risk of lung cancer due to air pollution around some coal-fired thermal power plants.»

Türkiye'nin kanser haritası çıkarılıyor, http://www.hurriyet.com.tr/turkiyenin-kanser-haritasi-cikariliyor-125796



Coal plants map, http://en.karaatlas.org/map/



Turkey

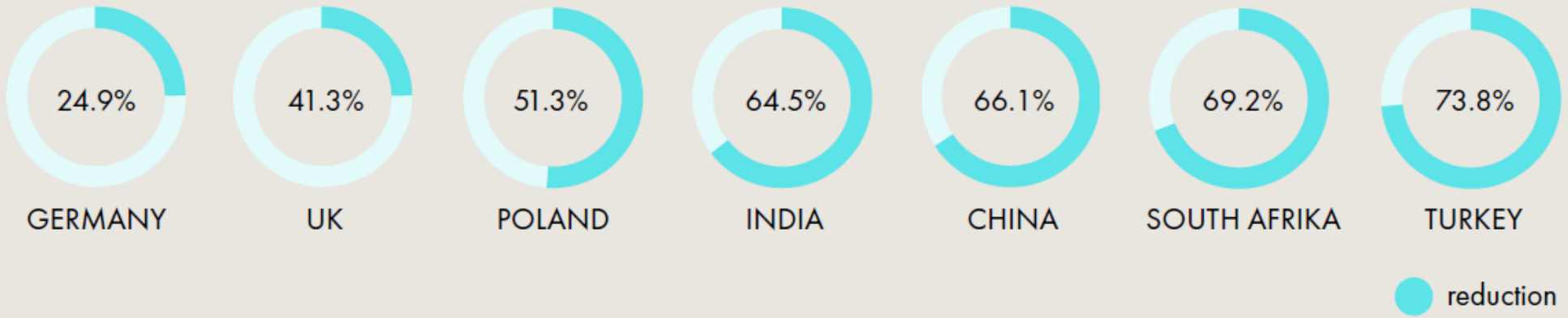
SWIMMING AGAINST THE TIDE: TOWARDS A COAL DEPENDENT FUTURE

28,881
premature deaths from air pollution

73.8%
Avoidable percentage of premature deaths

Avoiding early deaths from air pollution

By eliminating fossil fuel subsidies and implementing corrective taxes on oil, coal and gas, 24.9 to 73.8% of premature deaths could be avoided in the seven countries listed below.



Occupational accidents increased in coal industry especially in private sector

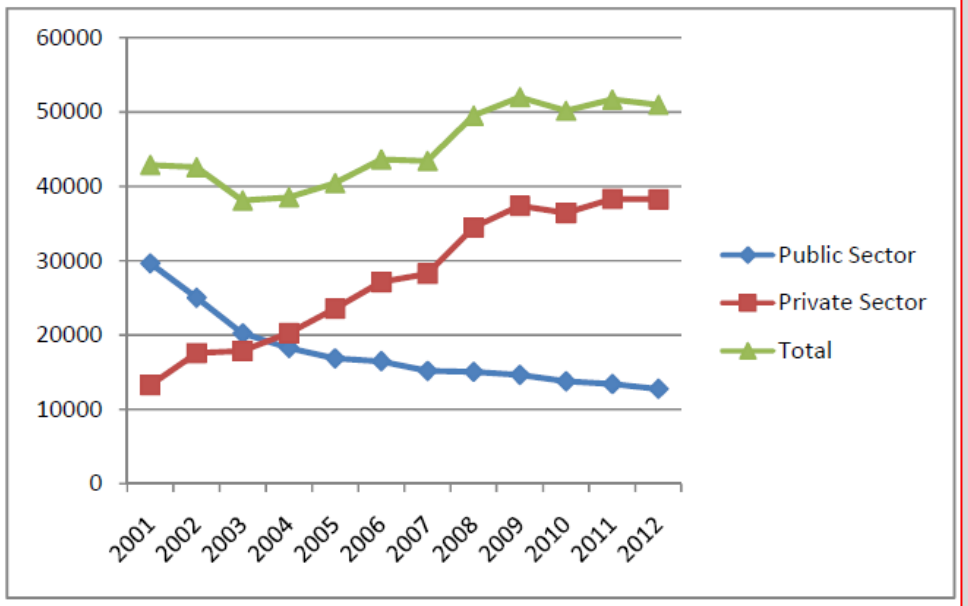


Fig. 1. Development of private sector employment in coal mine sector in Turkey

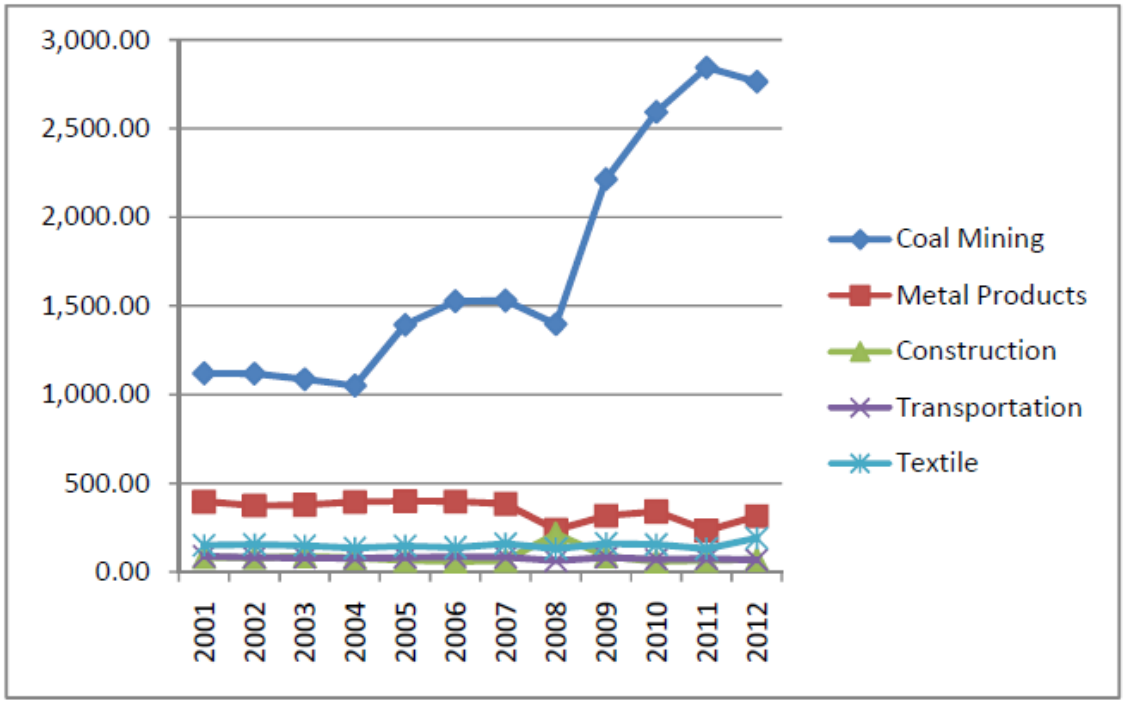
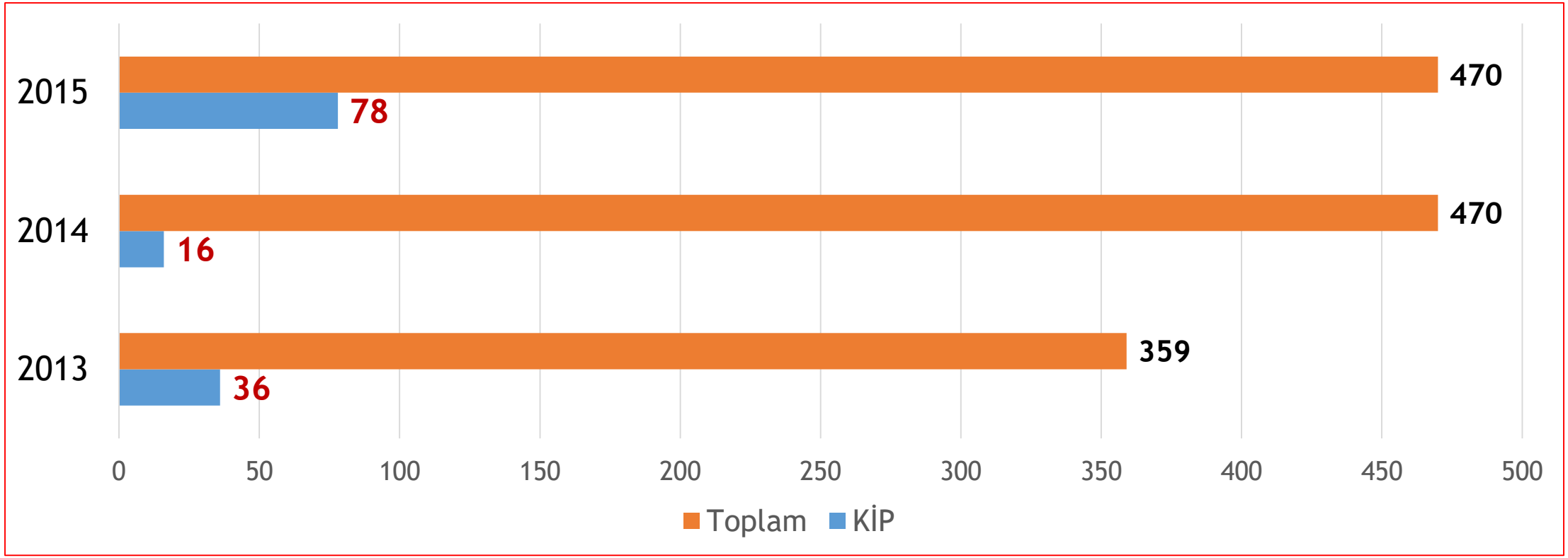


Fig. 2. Annual changes of standardized occupational accident rates in most occupational accidents occur in Turkey

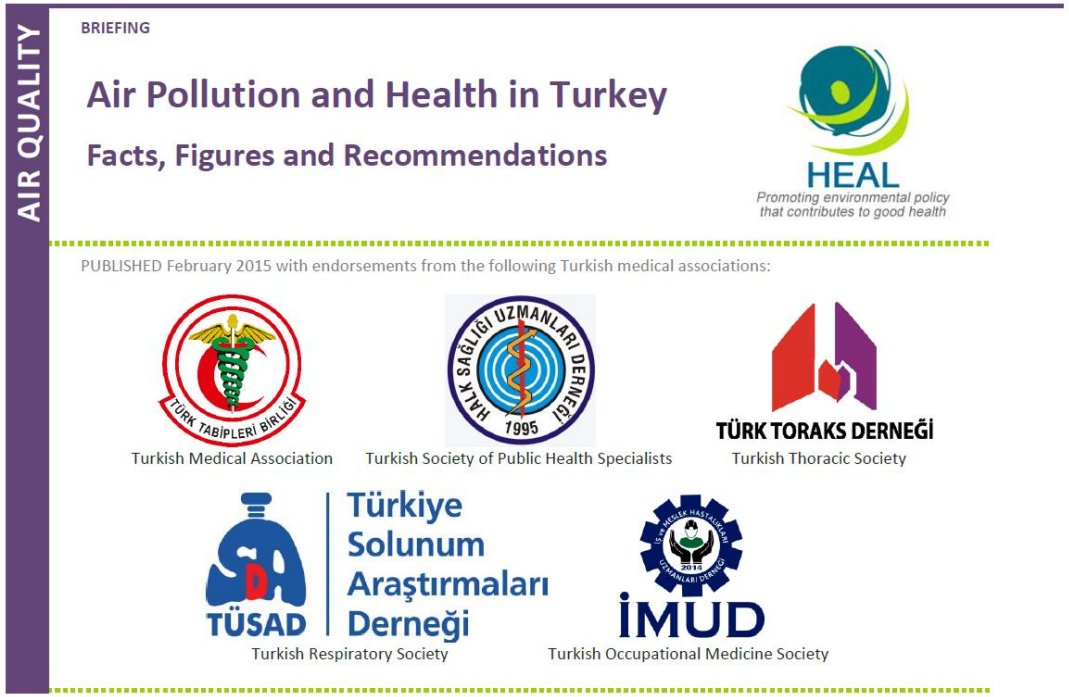
Yilmaz, F. The Relationship between Privatization and Occupational Safety in Coal Industry in Turkey; A Statistical Review of Coal Mine Accidents; *JSRR, 5(4): 265-274, 2015*

The case of coal workers‘ pneumoconiosis (KİP) increases



SGK İstatistik Yıllıkları

TMA strongly supports the phase out of coal


AIR QUALITY

BRIEFING

Air Pollution and Health in Turkey

Facts, Figures and Recommendations

HEAL
Promoting environmental policy that contributes to good health

PUBLISHED February 2015 with endorsements from the following Turkish medical associations:

Turkish Medical Association

Turkish Society of Public Health Specialists

TÜRK TORAKS DERNEĞİ
Turkish Thoracic Society

TÜSAD Türkiye Solunum Araştırmaları Derneği
Turkish Respiratory Society

İMUD
Turkish Occupational Medicine Society

The Turkish health sector speaks out

In October 2014, five Turkish medical organisations, led by the Turkish Medical Association (TTB), stated their concerns about coal power plants, highlighting that these plants have a significant impact on the health of the Turkish population[13]. They call on the Turkish government to not go ahead with the building of new plants, make binding the use of best available techniques for existing plants and start the phase out of coal plants.

Turkey needs to immediately stop subsidising fossil fuels and set up an effective action plan for cleaner air.