

# Coal Health Study

## Douglasdale Edition



### **Douglasdale Community Coal Health Study**

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India

United States

### **Contact Information**

Local GP

Health Minister

Coal Health Study Preparer

# Douglasdale Health Study

## Summary

There has been no commissioned research into the effects of open-cast coal mining on the health of Douglasdale residents. Globally, no research has yet been undertaken on the health effects of open-cast coal-mining operations which span such large spatial extents and decades-long time scale as those pending for the Douglasdale region.

Studies performed in the United States indicate higher lung cancer rates, and higher mortality rates for respiratory, heart, and kidney diseases in communities living in proximity to open-cast coal extraction operations.

In this report, the Douglasdale Community coal health study, simple analyses performed on publicly available data reveal striking ill-health in people who reside near the Douglas and Dalmellington open-cast coal mines, as compared with aggregated UK health statistics and with a nearby Scottish town upwind from the mines.

When considered in the context of the high rates of sickness prevalent in populations living near United States open-cast coal mines, the ill-health observed in Dalmellington and in Douglasdale populations warrants a thorough investigation on behalf of the affected.

## Introduction

There has been no commissioned research into the effects of open-cast coal mining on the health of Douglasdale residents.

In 1998, there was a single, preliminary study performed on the Lanarkshire population. The study was presented at the Annual Meeting of the Society for Social Medicine, and used geographical methods that are common now, although the methods were untested at

that time. The study nonetheless found a small but significant association between living near open-cast coal mines and contracting a respiratory disease.

Globally, no research has yet been undertaken on the health effects of open-cast coal-mining operations which span such large spatial extents and decades-long time scale as those pending for the Douglasdale region.

In India, investigations have begun into the nature of the particulates issuing from open-cast coal sites. In Australia, a country which excavates over 400 million tonnes of coal annually, most of it from open-cast mines, there has not been a single peer-reviewed study on the health effects of such coal extraction operations on the local population. There has, however, been recent concern about the effects of particles arising from open-cast coal extraction operations in the Hunter Valley of Australia.

Studies performed in the United States comparing the health of people living in proximity to open-cast coal mines have demonstrated higher rates of cardiopulmonary disease, chronic obstructive pulmonary disease, hypertension, lung disease, and kidney disease, even after correcting for the effects of covariates such as smoking and poverty.

Other comparative studies in the United States have demonstrated unusually high mortality rates for respiratory, cardiac, and kidney diseases in counties with open-cast coal mines, with the worst effects manifesting in populations near mines with extraction rates of greater than or equal to 4 million tonnes over a 4-year time period.

As these ill-health effects are observed to occur for extraction rates in the United States that are less than the open-cast extraction rates ongoing in and proposed for the Douglasdale area, an examination of the health of the Douglasdale residents is in order.

In this, the Douglasdale Community coal health study, a simple analysis is performed on publicly available data. Health statistics are examined for people who reside near the Douglas and Dalmellington open-cast coal mines, as compared with aggregated UK health statistics and with a nearby Scottish town upwind from the mines.

## Glossary

**Open-cast coal-mining** - a method of extracting coal from the earth by first removing the overlying soil and rock, then extracting the underlying coal. During this procedure, large quantities of particulate matter of varying composition is lofted into the atmosphere. The end result of open-cast mining is a sheared-off hill and a large open pit. Restoration activities include replacing some portion of the rock and/or filling the remaining pit with water.

**Particulate matter** - tiny particles of solid or liquid suspended in a gas or liquid, such as coal and mineral dust in the atmosphere. Particles less than 2.5microns in diameter (**PM2.5**) damage the lung lining, whereas particles 10microns (**PM10**) or greater are readily expelled from the lungs. A **micron** is one millionth of a meter.

**Chronic Obstructive Pulmonary Disease (COPD)** – condition that causes the airways of your lungs to narrow, leading to intolerable breathing difficulties. Can result from scarring of lung tissue due to smoking, or from repeated exposure to particulate matter such as dust from coal mining. COPD has been demonstrated to be a precursor to lung cancer, independent of the cause of the COPD itself.

**Chronic Kidney Disease (CKD)** – also called chronic renal disease, a progressive loss of renal function over a period of months or years. Often considered hereditary, it also occurs within populations adjacent open-cast coal mines for undetermined reasons.

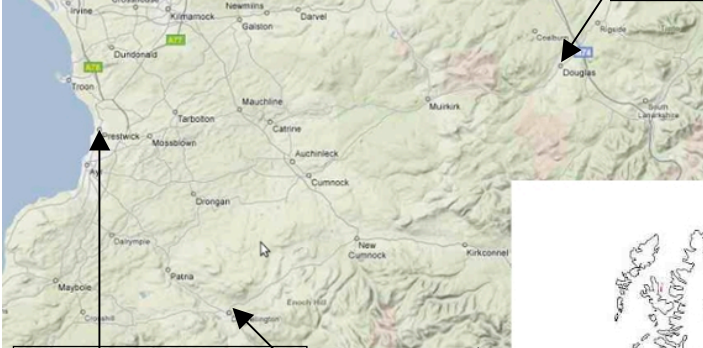
**Hypertension** – a medical condition in which the blood pressure is chronically elevated. Persistent hypertension is one of the risk factors for strokes, heart attacks, heart failure and arterial aneurysm, and is a leading cause of chronic renal failure.

**Hypothyroidism** – disease caused by insufficient production of thyroid hormone by the thyroid gland.

**Cancer** – is a class of diseases in which a group of cells display uncontrolled growth (division beyond the normal limits), invasion (intrusion on and destruction of adjacent tissues), and sometimes metastasis (spread to other locations in the body via lymph or blood).

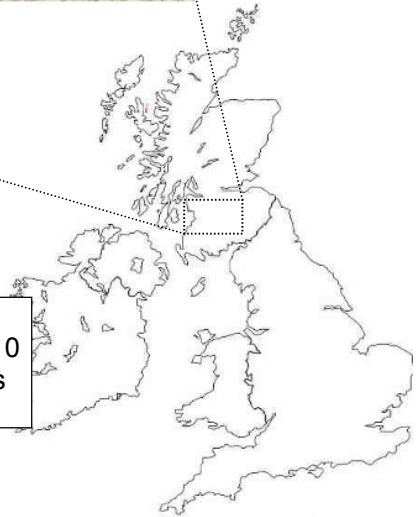
## Method: Site Comparison

**Douglas** – “dirty” site, 3 open-cast coal mines operating in vicinity.



**Prestwick** – “clean” site, no open-cast coal mines in vicinity.

**Dalmellington** – “dirty” site, formerly 10 open-cast coal mines operating in vicinity.

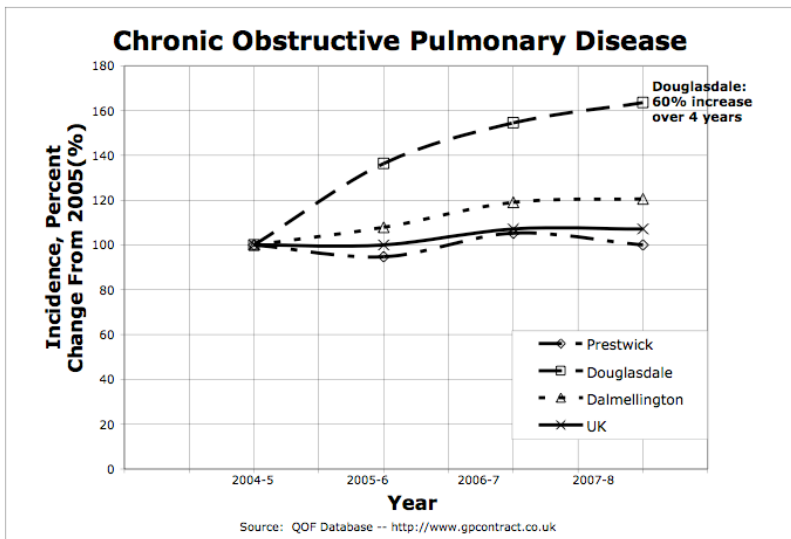


The Douglasdale area, comprised of the villages of Douglas, Rigside, and Coalburn, is host to multiple simultaneously operating open-cast coal mines, the extensions alone to one of which mines is estimated to contain 4 million tones of coal. Douglas is currently the proposed, and approved, site of several new coal mining extensions and of an entirely new open-cast mining operation to be located within 1000mt of the village’s hospital.

Prestwick, a seaside town with prevailing winds coming off the Irish Sea, is a relatively “clean” site, its atmosphere free of particulate matter arising from coal mining activities. Dalmellington, a village once ringed by 10 operational coal mines, most of which are now defunct, is considered a formerly extremely “dirty” site.

The Dalmellington site is helpful as an extreme case to assess the ill health effects of increasing the concurrently open tonnage near Douglasdale, and Prestwick is helpful in the opposite extreme, to control for any contributing factors to ill-health, such as poor diet or smoking, in the general Scottish population.

## Results: Health Statistics



Given space limitations of this pamphlet, we emphasize a single disease, chronic obstructive pulmonary disease (COPD), that is characteristic in individuals who regularly inhale particulates associated with coal-mining activities.

The figure above demonstrates that, at the coastal site of Prestwick, the incidence of COPD cases is relatively stable over the 4-year period of publicly available data, despite the presence of atmospheric particulate load contributions from the international airport there. In Dalmellington, where the 10 local open-cast mines are no longer

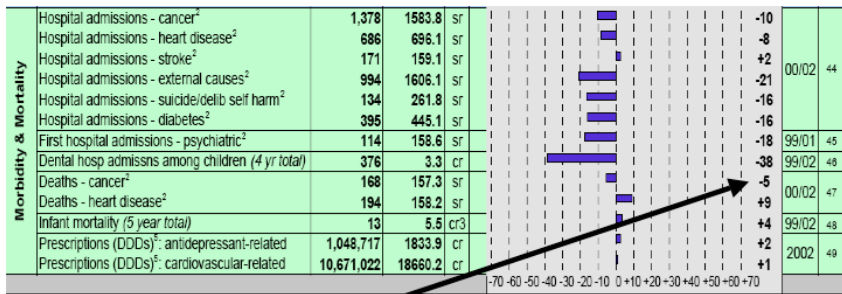
operational, the number of newly diagnosed COPD cases is increasing at a much lesser rate, but the number of existing cases is unusually high, at 7.6%, which is 5 times the UK average of 1.5%.

Currently, COPD incidence in the Douglasdale Medical Practice is over twice the UK average, up 60% from 2005, concurrent with the increasing extent of open-cast coal mining activities in the area.

A sampling of other comparative health statistics also reveals amplified incidence rates in Douglasdale: asthma and hypertension up 44%, hypothyroidism up 80%, and cancer rates up 250% over the past 4 yrs.

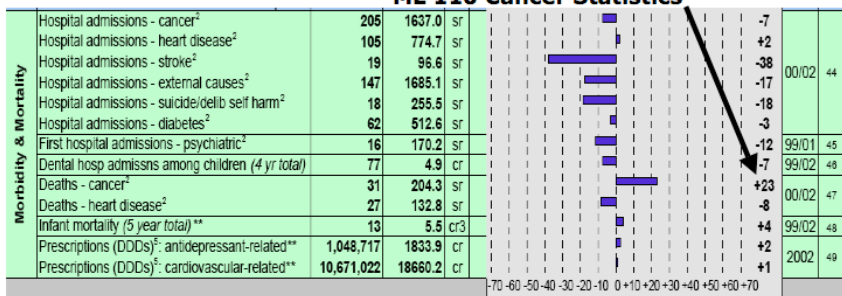
Some disease statistics are less reliable, having only been surveyed for the past two years, such as chronic kidney disease (CKD), a disease that has been shown to have increased incidence in areas adjacent to coal mines in the eastern United States. The incidence of CKD between these two years in Douglasdale has doubled.

### Clydesdale, ML 11 0 Comparison: Deaths from Cancer



### Clydesdale Cancer Statistics

### ML 110 Cancer Statistics



The cancer rates in Douglasdale merit specific mention. As the above figure indicates, NHS Scotland reports that the greater Clydesdale area cancer rate is 5% less than the Scottish average, however Douglasdale, situated within Clydesdale, has a cancer rate 23% greater than the Scottish average.

## A Community Health and Well-being Profile Clydesdale, 2003

INDICATOR	ML11 0	ML11 7	ML11 9	ML12 6
Adults unable to work due to illness/disability	+27%	+11%	+2%	-43%
Disability Living Allowance claimants	+52%	+30%	+2%	-43%
Long Term Limiting Illness	+20%	+12%	+3%	-12%
Adults with No Qualifications	+37%	+8%	+9%	-6%
Unemployed Claimants	+25%	-1%	+11%	-42%
Income Support Claimants	+29%	+8%	-8%	-49%
Low Birth Weight Babies	+19%	-3.7%	-25%	-16%
Deaths - Cancer	+23%	+1%	-15%	0

**Annual Data Obtained from The Public Health Institute Scotland**

The above figures relate to the Scottish average: "+" values are above the Scottish average, and "-" values are below the Scottish average.

ML11 0 postcode is comprised of **Douglas, Coalburn, and Lesmahagow.**

ML11 7 postcode contains the town of Lanark.

ML11 9 postcode is comprised of Blackwood, Kirkmuirhill, and Rigside.

ML12 6 postcode is comprised of Biggar, Leadhills, and Abington.

In the above table, Clydesdale data are disaggregated by post code for 2003 (disaggregated data are not readily available for 2008). This juxtaposition makes it immediately apparent that there are much greater rates for all parameters, ranging from 27% greater adult unemployment due to illness/disability to 23% greater death rate from cancer, in the post code ML 11 0 region of Clydesdale.

## Conclusion

The above preliminary analysis of disease incidence and mortality indicates that there are significant differences between the baseline health statistics at Prestwick and those in areas, such as Douglasdale and Dalmellington, in which there are open-cast coal mines.



While the relative ill-health of the inhabitants of post code ML 11 0 is not as yet attributable to any specific cause, when considered in conjunction with the relative well-being of the inhabitants of nearby post code ML 12 6, it is evident that the primary environmental difference for the healthy populations is the lack of multiple, concurrent open-cast mining operations in the vicinity.

The discrepancy between the low rate of death from cancer that the inhabitants of the greater Clydesdale area exhibit and the high rate of death from cancer in the Douglasdale sub-region of Clydesdale is particularly troubling, as there is little to differentiate these populations from one another, apart from the coal-mining activities.

Such readily apparent health differences warrant the halt of further expansion of open-cast coal mining in the region until it is determined, by commissioned epidemiological study, what the tolerably safe level of concurrent open-cast coal mining is.

## **Peer-Reviewed Literature**

There are surprisingly few peer-reviewed studies in the body of international literature that examine the effects of open-cast coal extraction upon the health of the local population. Listed below are the citations for 16 peer-reviewed studies that bear directly on this topic.

Of the 16 peer-reviewed studies cited below, 12 examine the incidence of and/or mortality from disease in populations living near open-cast coal mining operations, 2 quantify the quantity and characteristics of the dust emitted, 1 demonstrates that COPD is a precursor to lung cancer irrespective of smoking history, and 1 explains the mechanism whereby pollutants act to damage lung tissue.

The 12 disease in coal-affected population articles comprise the published peer-reviewed literature to date, and of these 12 studies, 10 studies found significant ill-health effects within coal-mining areas. One study found only small ill-health effects, and one study found no ill-health effects. The studies that found little or no ill-effect were both performed in the UK at the University of Newcastle upon Tyne.

## In the UK

Asthma and open cast mining. J.M.F. Temple and A.M. Sykes, *British Medical Journal*, 1992.

Respiratory Morbidity in Merseyside schoolchildren exposed to coal dust and air pollution. B. Brabin, M. Smith, P. Milligan, C. Benjamin, E. Dunne, and M. Pearson, *Archives of Disease in Childhood*, 1994.

Living near opencast coal mining sites and children's respiratory health T. Pless-Mulloli, D. Howel, A. King, I. Stone, J. Merefield, J. Bessell, and R. Darnell, *Occup. Env. Med.*, 2000.

Consultations of Children Living Near Open-Cast Coal Mines. D. Howel, T. Pless-Mulloli, and R. Darnell, *Environmental Health Perspectives*, 2001.

Prevalence of asthma and other respiratory symptoms in children living near and away from opencast coal mining sites, T. Pless-Mulloli, D. Howel, and H. Prince, *International Epidemiological Association*, 2001.

## In Europe

Lead and Cadmium Exposure in Children Living Around a Coal-Mining Area in Yatagan, Turkey. G. Yapici, G. Can, A.R. Kiziler, B. Aydemir, I.H. Timur, and A. Kaypmaz, *Toxicology and Industrial Health*, 2006.

Early Childhood Lower Respiratory Illness and Air Pollution. I. Hertz-Picciotto, R.J. Baker, P-S. Yap, M. Dostal, J. Joad, M. Lipsett, T. Greenfield, C.E.W. Herr, I. Benes, R.H. Shumway, and K.E. Pinkerton, *Environ Health Perspect.* 2007.

Air Pollution, Oxidative Stress, and Dietary Supplementation: A Review. I. Romieu, F. Castro-Giner, N.Kunzli, and J. Sunyer, *European Respiratory Journal*, 2008.

COPD Prevalence is Increased in Lung Cancer, Independent of Age, Sex, and Smoking History. R.P. Young, R.J. Hopkins, T. Christmas,

P.N. Black, P. Metcalf, and G.D. Gamble, *European Respiratory Journal*, 2009.

## In India

Status of Air Pollution Caused by Coal Washery Projects in India. M.K. Ghose and S.K. Banerjee, *Environmental Monitoring and Assessment*, 1995.

Environmental Impacts of Coal Mining In India. Krishnamurthy, K.V. *Proceedings of the National Seminar on Environmental Engineering with special emphasis on Mining Environment, NSEEME-2004*, March 2004.

Generation and Quantification of Hazardous Dusts from Coal Mining in the Indian Context. M.K. Ghose, *Environmental Monitoring and Assessment*, 2007.

Characteristics of Hazardous Airborne Dust Around an Indian Surface Coal Mining Area. M.K. Ghose and S.R. Majee, *Environmental Monitoring and Assessment*, 2007.

## In the United States

Relations between Health Indicators and Residential Proximity to Coal Mining in West Virginia. M. Hendryx and M. Ahem. *American Journal of Public Health*, 2008.

Lung Cancer Mortality is elevated in coal-mining regions of Appalachia. M. Hendryx, K. O'Donnell, and K. Horn, *Lung Cancer*, 2008.

Mortality from heart, respiratory, and kidney disease in coal mining areas of Appalachia. M Hendryx, *Archives of Occupational and Environmental Health*, 2009.

# Public Lecture

The esteemed Dr. Dick van Steenis will be giving a public lecture on his investigations into the adverse health effects of coal extraction on Wednesday, 23 September at 7:00PM at St Bride's, Centre Douglas.

If time permits, there will be a question and answer session afterward.

## Contact Information

### Your Local GP

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### Your Health Minister

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### Coal Health Study Preparer

This preliminary report, the Douglasdale Community Coal Health Study, has been compiled by Kirstie Stramler, Ph.D for the use of the Douglasdale Community. It is not for sale, nor may the content be reproduced for commercial purposes.

The scientific investigation in this report has been composed solely with the use of uncontested, publicly accessible data.

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