

Health risks of night shift work

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Executive summary

Health Council of the Netherlands



At request of the Minister of Social Affairs and Employment, the Health Council appointed a committee to evaluate the current scientific insights into the health risks of night shift work. These insights are relevant as about 15% of the working population in The Netherlands (almost 1.3 million workers) sometimes or regularly work at night, and there are signals in the scientific literature indicating that this can lead to diseases. The present advisory report is focused on the question of whether there is a relationship between night shift work and the risk of adverse health effects. Furthermore, the committee examines the possibilities for identifying high-risk groups and the possibilities for preventing adverse health effects that may develop in the long term in particular.

Why does night shift work harm health?

A large number of biological processes is rooted in a daily rhythm that is controlled by an internal biological clock. This clock ensures the human body is 'synchronised' with the natural light and dark cycle thanks to the presence of daylight.

Working at night disrupts this rhythm due to being awake and active (physical activity, eating, exposure to light) at a time the body is naturally inclined to be sleeping, and sleeping at a time when the body wants to be awake. The biological clock attempts to adjust to the new situation, but it takes time and is often not wholly successful. This can disrupt physical processes, reflected by disturbed sleep and impaired capacity for recovery, for example.

Proven health effects: diabetes mellitus (type 2), cardiovascular diseases and sleeping problems

Night shift work increases the risk of diabetes mellitus (type 2), cardiovascular diseases and sleeping problems. The risk of developing diabetes and cardiovascular diseases increases with the number of years of night shifts. It is estimated that 21 of 100 cases of diabetes mellitus among night shift workers is due to working night shifts. For cardiovascular diseases, the estimated number of attributable cases is 23 out of 100. These estimates apply to

night shift workers who have worked night shifts for forty years, or practically their entire working lives. Night shift work can result in diabetes mellitus (type 2) or cardiovascular disease because glucose and fat metabolism is less active at night than during the day. Eating at night can result in higher blood glucose levels and greater fat storage in the body than would be the case during the day. This can result in overweight and pre-diabetes, for example. These are risk factors for diabetes mellitus and cardiovascular diseases.

The committee found a strong relationship between night shift work and sleeping problems. Sleeping problems (shortened sleeping duration, poorer sleep quality and fatigue) are estimated to be 1.5 to 2 times as common for night shift workers than for day shift workers. Sleeping problems are part of sleeping disorders. There have been case reports of a sleeping disorder related to working night shifts, the shift work disorder. However, due to the definition used for this sleeping disorder and a lack of data, the committee cannot assess whether night shift



workers are more prone to having a sleeping disorder than day shift workers.

Weak evidence for a relationship with metabolic syndrome

The Committee also assessed whether there is a relationship between night shift work and the metabolic syndrome. This condition shares the same underlying risk factors with diabetes mellitus (type 2) and cardiovascular diseases. Given the relatively limited number of available studies and the heterogeneity between studies, the Committee finds the evidence supporting an association with this condition to be weak.

Unclear health effects: breast cancer

The Committee concludes that research among night shift workers who have worked shifts for extended periods is unclear with respect to the risk of breast cancer. In 2006, the Health Council concluded that there was an association between night shift work and breast cancer. However, based on new data from long-term and new studies, this conclusion is no longer

tenable. Individual studies do suggest that there may be a higher risk of breast cancer when working night shifts for a prolonged period at a young age, during a period of shift work, or immediately following a period of shift work. However, most of these studies only show an increased risk in the group of night shift workers with the highest number of years of working at night; additionally, the risk estimates are based on a small number of cases of breast cancer. Experimental studies using genetically modified animal models, among others, indicate that disruption to the internal biological clock promotes breast tumour development, but the multitude of aspects that play a role in this process have not yet been clarified.

No evidence for associations: other diseases

No conclusions may be drawn about the relationship between night shift work and other diseases at this time; the amount of research conducted in this field is limited, and it remains unclear whether available studies have focused

explicitly on working night shifts, or on shifts outside of usual working hours, such as evening shifts.

Longer duration of night shift work: higher risk of disease

The committee identified a high-risk group within the population of night shift workers, namely workers who work night shifts for a prolonged period. They have a risk of diabetes mellitus (type 2) and cardiovascular diseases that is clearly higher than for night shift workers who have worked fewer years of night shifts. Available research does not allow identification of at-risk groups of night shift workers based on unfavourable personal, lifestyle or environmental factors (other than working night shifts) who are certain to be at increased risk of disease (or worsening of disease) due to working at night compared to night shift workers without these factors.

Preventing long-term effects

Preventive measures should try to keep physical



processes in synchronisation with the internal biological clock. This means it is best to limit work during night shifts where possible. If working at night is necessary, the committee refers to the recommendations made in the previous Health Council advisory report on preventing negative health effects that may occur in the short term, such as sleeping problems. The committee has no suggestions on how to prevent the adverse health effects that may develop in the long term. The research into the efficacy of potential measures for combating diabetes mellitus (type 2) and cardiovascular diseases in night shift workers is too limited at this time.



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The Health Council receives most requests for advice from the Ministers of Health, Welfare and Sport, Infrastructure and the Environment, Social Affairs and Employment, and Economic Affairs. The Council can publish advisory reports on its own initiative. It usually does this in order to ask attention for developments or trends that are thought to be relevant to government policy.

Most Health Council reports are prepared by multidisciplinary committees of Dutch or, sometimes, foreign experts, appointed in a personal capacity. The reports are available to the public.

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