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expenditure [12]. Evidence from a recent review of the economic benefits of these programs concluded that it is 'one of the most effective strategies for reducing medical costs and absenteeism' [15]. Consequently, more and more employers are implementing health promotion and intervention programs in their companies [12]. The economic outcomes of worksite health promotion programs will be discussed in more detail later in this literature review.

In addition to the economic benefits, previous research has shown that worksite health promotion programs are effective in reducing the risk for NCD's among employees [16]. Although the effect sizes of these interventions on health vary and are less than that observed in clinical trials, it has still been advocated as it results in marginal changes [16]. Small changes in behavior and health parameters have been shown to result in a considerable impact on disease risk when observed at a population level [10].

The next section of the literature review will present data on the prevalence of NCD risk factors followed by an overview of the effectiveness of worksite health promotion programs.

Physical NCD factors

The main risk factors for NCD's were reported in the introduction of this literature review. The risk factors that encompass lifestyle behaviors, namely, physical activity, and healthy diet (together with obesity) will be the focus of this section of the review. Indeed, the WHO identified these behaviors as among the five leading causes for global mortality [17].

Physical inactivity is widely recognized as a major risk factor for NCD's [7,8]. If it were possible to reduce to the global pandemic of physical inactivity, it has been estimated that between 6-10% of all deaths due to NCD's may be prevented [8]. For example, approximately 21-25% of breast and colon cancer and 27% of the burden of diabetes could be reduced by reducing the levels of physical inactivity [17]. However, more than half (58%) of the world's population do not meet the physical activity guidelines, which is similar to the number of Africans who are currently insufficiently physically active (60%) [17].

Changes in dietary behaviors with increased consumption of refined starch, sugar, salt and unhealthy fats has contributed to the increased prevalence global prevalence of obesity, which has more than doubled since 1980 [1,12]. A recent WHO report states that four in ten people are either overweight or obese (BMI 24.9 kg/m²) [17]. The 'Workplace Wellness Alliance' reported that the prevalence of obesity in African employees is nearly 20%, and is higher than that reported for Europe and South America [12]. This prevalence is slightly less than that reported in the population average which is from WHO survey which was conducted in adults (not only in the worksite setting) between 1996 and 2009 (Figure 1) [12]. Furthermore, the WHO reported that 41% of all deaths in Africans under the age of 60 years could be attributed to a high Body Mass Index [17].

The prevalence of NCD and cardio-metabolic disease has been investigated in the employed population, although less so in South Africa. Ker et al., 2007 described the frequency of metabolic syndrome among South African corporate executives comprising of men (n=1367)

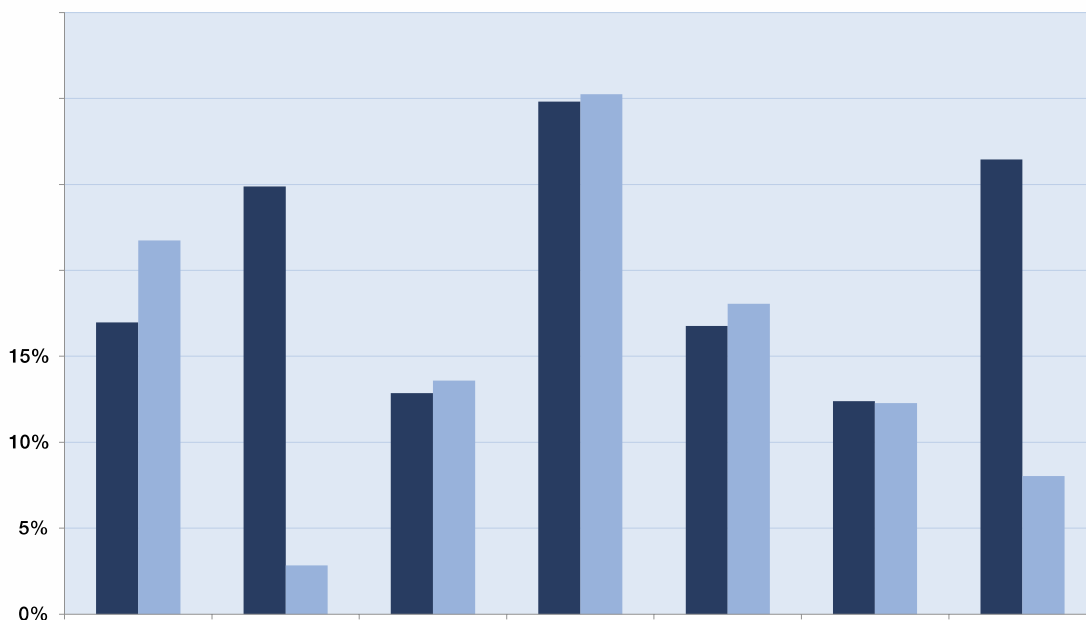


Figure is from the 'The Workplace Wellness Alliance: Making the right investment - Employee Health and Power of Metrics' report [12]
 BMI: Body Mass Index
 WEF: World Economic Forum
 WHO: World health Organization

Figure 1: Prevalence of obesity (BMI>30 kg/m²) among employees from the WEF Alliance survey and WHO population survey.

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rated health status and lifestyle behaviors anonymously [31]. The non-participants also reported on their reason for declining to participate in the HRA intervention program [31]. The main reasons the non-

[36]. As those individuals with healthier lifestyle behaviors had lower subsequent medical expenses, as HRA's and related intervention programs have might play a role in attenuating the economic impact of NCD's on the economy.

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The burden of NCD's is increasing globally, however more so in low-middle-income countries. The workplace provides an opportune setting for health promotion programs which aim to address NCD's and their risk factors. The HRA, can be regarded as the first step towards

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