An ecological approach to non-communicable disease prevention in the workplace

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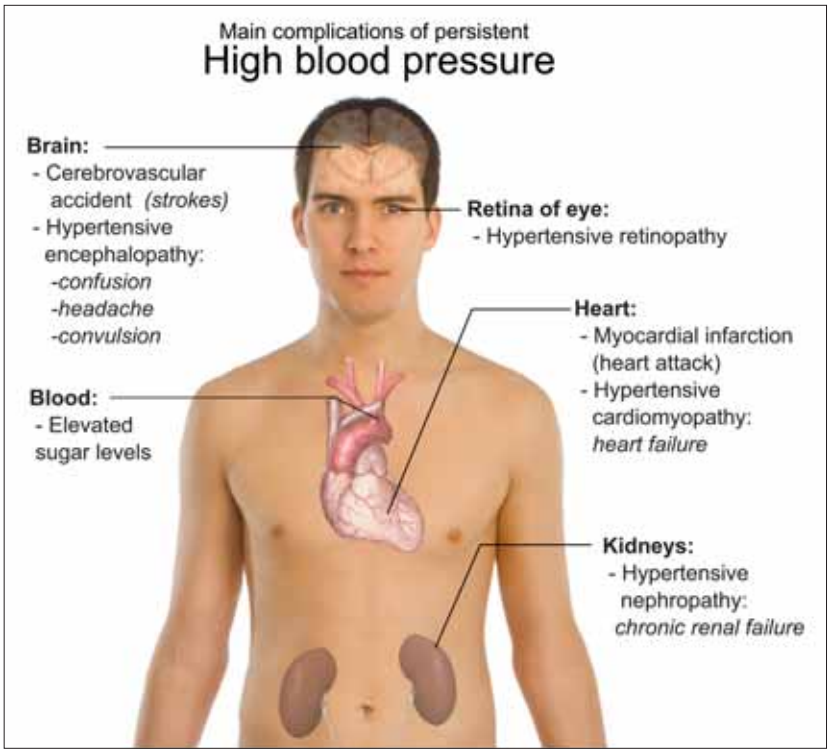
Abstract

Non-communicable diseases are the leading cause of death globally, killing more people each year than all other causes combined. Furthermore, behavioural risk factors for NCDs fall increasingly on poorer people within all countries, mirroring the underlying socio-economic determinants. The need for prevention efforts through well-planned, cost-effective and feasible interventions across all levels of society is therefore obvious. The workplace provides an important setting for the implementation of such interventions. Within the context of ecological models it is proposed that intervention programmes should be aimed at all relevant ecological levels. Workplace programmes should strive to create environments and policies to make healthful choices, and then motivate and educate people about those choices. This paper describes a framework, based on an ecological model, for developing and implementing effective workplace health promotion programmes.

Key words: ecological approach, socio-ecological model, workplace, health promotion; non-communicable diseases

Introduction

Non-communicable diseases (NCDs), comprising mainly cardiovascular diseases, cancers, diabetes and chronic lung diseases, are the leading cause of death globally, killing more people each year than all other causes combined.[1] The World Health Organization (WHO) reports that nearly 80% of NCD deaths occur in low- and middle-income countries.[1] As a middle-income country,[2] South Africa is no exception to this world-wide trend. According to Mayosi[3] the country is in the midst of a "profound health transition" that is characterised by a quadruple burden of communicable, non-communicable, perinatal and maternal, and injury-related disorders. The contribution of NCDs to the human, social and economic cost of this burden is largely preventable, since the four behavioural risk factors, tobacco use, an unhealthy diet, insufficient physical activity and the harmful use of alcohol, are all avoidable and modifiable.[1]



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Although Schneider et al.,[4] after analysing two national data sets, concluded that NCDs affect both poor and wealthy South Africans, they suggested that these diseases and their risk factors are poorly identified and inadequately treated within the South African context, and particularly among the poor. The work by Schneider et al.,[4] and the 2010 WHO[1] report show clearly that the greatest effects of the behavioural risk factors for NCDs fall increasingly on poorer people within all countries, mirroring the underlying socio-economic determinants.

The need for prevention efforts through well-planned, cost-effective and feasible interventions across all levels of society is therefore clear.[5] According to Pratt et al.,[6] large numbers of working adults of varying socio-economic levels and ethnic backgrounds can be reached through workplace interventions. Numerous researchers have shown that workplace interventions can have positive psychosocial and behavioural effects on NCD-related risk factors such as physical activity, smoking and dietary behaviours.[7,8] Therefore, the WHO recommends that companies should adopt and strengthen programmes to improve the health and well-being of their employees through workplace health promotion and specific NCD prevention programmes.[1,9] This paper describes how to plan and implement effective work-place health promotion programmes to address NCDs.

A systematic review of related literature, points to the need for NCD prevention programmes to be multi-component

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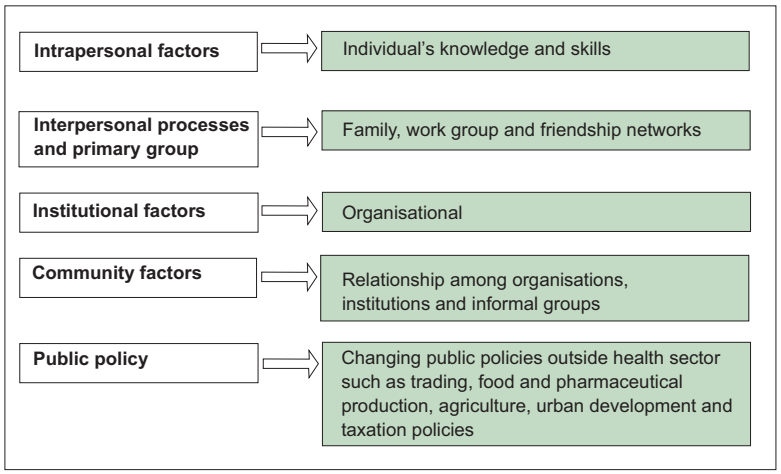

Figure 1. Socio-ecological levels as proposed by McLeRoy et al.[11]

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and adapted to the local context.[7] The review concluded that culturally and environmentally appropriate programmes that involved workers in planning and implementation were far more likely to be executed and sustained.[7] In an earlier review, Harden et al.[10] warn that although the workplace has enormous potential as a setting for improving the health of the adult population, many programmes seem to ignore the needs and views of the target population in the planning and implementation of workplace health promotion programmes. Many interventions focus on changing the behaviour of the individual,[6] following the ideology of "individual" responsibility of disease, thus ignoring the connection between individual behaviour and the environment in the process.[11] This approach of "changing individuals" results in single level interventions, while neglecting those factors in the social and physical environment that serve to enable, facilitate and reinforce unhealthy behaviours. Sallis et al.,[12] emphasise that educating people to make healthful choices when environments are not supportive is likely to produce weak and short-term effects.

According to Green and Kreuter,[13] health status and quality of life are influenced by a combination of our genetic predisposition, the actions we take or do not take (i.e. behaviours) as individuals and groups, and a wide range of social and environmental factors, which are referred to as social determinants of health. The latter includes factors such as culture, employment, education and the physical environment. Therefore, it can be argued that successful/appropriate intervention planning should consider all these potential determinants.

Pratt et al.,[6] similarly argue that workplace health promotion efforts must address organisational factors (e.g. socio-cultural, economic); the work environment (e.g. physical and structural) and job demands and worker characteristics. Ecological models of health behaviour emphasise these multiple levels of influence on health behaviour and quality of life. Suggestions have been made that the application of these models to workplace interventions which aim to prevent NCDs will ensure that the environmental and policy contexts of behaviour as well as social and psychological influences are incorporated in the programme.[11,13] This could contribute to the development of workplace programmes that are cost-effective and sustainable.[6]

Taking an ecological approach to workplace NCD prevention programmes

The origins of the ecological perspective date back as far as 1848 when Rudolf Virchow, the father of modern pathology, identified socio-economic factors such as poverty as key factors in the development of disease, disability and death.[13] Most of the systematic theory building on the ecological perspective has, however, been done by Bronfenbrenner, the psychologist well known for his work in child development. He argued that in order to understand human development, the whole ecological system in which growth occurs must be considered and subsequently described this as "a concept of people existing within a system of relationships with levels of environmental influence". "Any change on one level automatically waves through to the next level".[14]

A variation on Bronfenbrenner's conceptual framework in the form of a social ecological model for health promotion was proposed by McLeroy et al.[11] According to this model, behaviour is influenced by five levels of influences, namely intrapersonal factors, interpersonal processes, institutional and community factors as well as public policy (see Figure 1). According to Bartholomew et al.,[15] the socio-ecological model allows for consideration of influences both vertically across levels and horizontally within levels, resulting in a "complex web of causation as well as rich context for intervention".

Within the context of ecological models it is thus proposed that intervention programmes should be aimed at all relevant ecological levels, which is seen to be the most important "strength" of such models.[12] Glanz and Mullis[16] had already recognised several decades ago that while policy and environmental changes can affect an entire workforce, interventions may reach only those individuals who choose to participate.

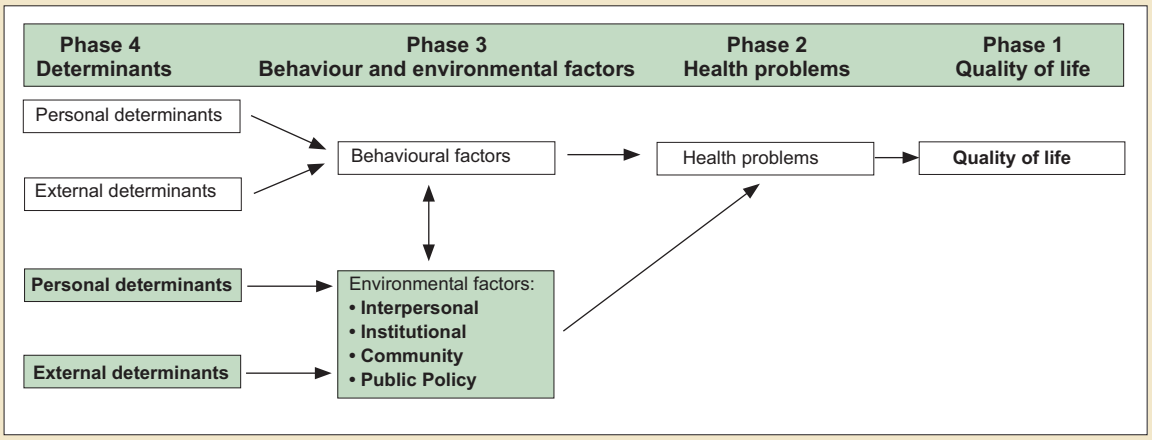

Figure 2. Logic model for needs assessment (adapted from the PRECEDE model by Bartholomew, et al.)[15]

Although ecological models hold the advantage of establishing settings and incentives that may contribute to sustained behaviour change,[12] application of such models in the development of health behaviour change programmes present challenges.[13,17] According to Elder et al.,[17] ecological models typically present domains of variables to be considered, but do not give specific guidance on which variables within each domain might be most important for the topic at hand. Integrating other models such as the PRECEDE[13] (see Figure 2) and transtheoretical[18] models and theories of learning/behaviour change, such as the social cognitive theory[19] into the ecological model can provide specificity to intervention planning.

Another challenge is that environmental and policy influences that are emphasised in ecological models are also specific to certain health risks and behaviours, e.g. to ensure increased physical activity levels through workplace interventions. A policy about time allowance for physical activity during work hours will perhaps need to be adopted, while ensuring that the means to be physically active are in place, e.g. safe environment for walking during lunch break or an exercise facility such as a gymnasium. On the other hand, to address poor eating behaviour it may be necessary to implement a policy of selling only healthy foods in work-based food outlets. From these examples it is clear that the application of ecological models needs to be tailor-made for each behaviour-identified risk for a particular health condition.[17]

Considering these challenges, Bartholomew et al.[15] recommend that a framework for intervention development (intervention mapping) that incorporates different theories, ideas and information into the ecological model be used. Despite the fact that researchers have found the intervention mapping process to be associated with its own complexities, it provides developers of interventions with valuable steps to follow. To illustrate the application of the five levels of the ecological model suggested by McLeroy[11] (Figure 1) in developing a worksite intervention using intervention mapping to guide the process, an adapted and simplified version

Continued on page 11

". . . educating people to make healthful choices when environments are not supportive is likely to produce weak and short-term effects."

Table 1. Steps in the intervention mapping approach and an example of its application

Steps	Example: Health problem of hypertension
Step 1: Needs assessment The planner assesses the health problem, its related behaviour and environmental conditions and associated determinants for the at-risk population by completing the following tasks: • Conduct the needs assessment using an adapted PRECEDE model (see Figure 2, which focuses on personal and external determinants i.e. enablers, barriers and reinforcers)[13] to identify the individual and environmental determinants of the health problem under consideration; prioritise identified determinants for intervention planning. • Assessing capacity: ° determine available assets/resources within/external to the institution; and ° assess the relevant policies and physical environment. • Establish desired programme outcomes State the programme outcomes in terms of health or quality of life indicators. Health outcomes can be stated in terms of incidence or prevalence and will include a statement of what will change, by how much and over what period of time, while quality of life indicators include absenteeism, achievement, happiness and self-esteem.	Recognised lifestyle-related determinants of hypertension: Obesity, inactivity, alcohol use, stress, dietary factors, and specifically high salt intake. Example taken further: High salt intake Determine the **personal and external determinants** (enablers, reinforcers, barriers) for the behaviour, for example" • workers like high salt food (intrapersonal determinant); • workers bring lunchboxes with high salt foods to work because that is what is available at home (interpersonal); • only high salt food and snack items are sold at the workplace (institutional); • health services available to the workers (private or public) do not provide dietary advice (community); and • no laws exist to control the amount of salt in staple food such as bread (policy). **Programme outcome:** To reduce the number of staff members with high blood pressure by 30% (Remember eating less salt will only be one component of the programme, obesity, physical inactivity etc. may also need to be addressed)
Step 2: Specification of who or what will change at each ecological level (Figure 1) as a result of the intervention 1. Specify the behavioural and environmental objectives that the programme seeks to accomplish. 2. State what the programme participants will do or how an environmental condition will be modified.	**Various behaviour outcomes could be set,** e.g. reduce total number of high salt foods consumed by 30%. The matching **environmental outcome** at the organisational level could be: Worksite cafeteria offers low salt meal options at each meal. To change their behaviour workers must choose to eat the low salt food items. Identify and select options on how to facilitate this to improve their knowledge and/or change their attitudes to low salt foods.
Step 3: Select theory-based methods and practical strategies 1. Review programme ideas with the intended participants and use their perspectives when choosing methods and strategies. 2. Identify theoretical methods that can influence changes in determinants and identify the conditions under which a given method is most likely to be effective. 3. Choose theoretical methods to be used in the programme. 4. Select or design practical strategies for implementing the methods in order to change participants' behaviour or environmental conditions.	Taking "changing attitudes to low salt food" as an example, the planner will need to do the following in this step: Search the literature for theories about changing attitudes or explore theories that address behaviour change in general (such as the Social Cognitive Theory [SCT]) and see what this theory has to offer for this particular objective. In the example mentioned above modelling, [learning through observation learning, i.e. SCT] could be used as a method. Conditions for effective implementation of this method include: The learner must be able to identify with the model. The model must receive reinforcement and the learner must perceive a coping model, not a mastery model. A practical strategy for implementing this method would be to have an appropriate live or virtual model showing the desired behaviour online or on video.
Step 4: Programme 1. Consult again with intended participants and integrate their preferences into the programme design. 2. Describe programme scope and sequence, themes and needed programme materials. 3. Prepare design documents that will aid various professions in producing materials that meet the programme objectives and adhere to specific guidelines for particular methods and strategies. 4. Develop programme materials. 5. Pre-test materials and oversee the final production.	
Step 5: Adoption and implementation plan 1. Revisit and complete the question of who will adopt and use the programme. 2. Decide who has to do what in order for the programme to be adopted, implemented and sustainable.	
Step 6: Evaluation plan 1. Using the programme outcomes for quality of life, health, behaviour, and environment that were determined in Step 1, write objectives and evaluation questions. 2. Based on Step 2, write evaluation questions for behavioural and environmental determinants. 3. Write process evaluation questions based on the description of methods, conditions, strategies programme and implementation. 4. Develop indicators and measures. 5. Specify evaluation design and write an evaluation plan.	

Continued from page 9

of the approach used by Bartholomew and co-workers[15] is presented in Table 1. Note that a very simplified example of the development of one programme component to address the health problem of hypertension is provided to guide the reader through the first three steps of the planning process.

Conclusion

Non-communicable diseases present an urgent public health problem in South Africa and the need exists for workplace interventions that can address both the individual and environmental factors that affect the lifestyle behaviours of workers. Ecological models help us to understand how people interact with their environments and that understanding can be used to develop effective multi-level approaches to improve health behaviours though workplace programmes.[13] The basic premise of the ecological perspective is that providing participants in workplace programmes with motivation and skills to change behaviour cannot be effective if the environments and policies at companies and institutions make it difficult or impossible to choose healthful behaviours. Workplace programmes should therefore strive to create environments and policies that make it "convenient, attractive, and economical"[13] to make healthful choices, and then motivate and educate people about those choices.

Lessons learned

- Non-communicable diseases pose serious concerns for South Africans.
- Workplace interventions can reach large numbers of working adults of varying socio-economic levels and ethnic backgrounds.
- Although challenging, applying ecological models to workplace interventions has the advantage of establishing settings and incentives that may contribute to sustained behaviour change.
- Educating people to make healthful choices when environments are not supportive is likely to produce weak and short-term effects.
- Making use of a structured framework within the ecological approach is necessary when planning workplace NCD interventions.

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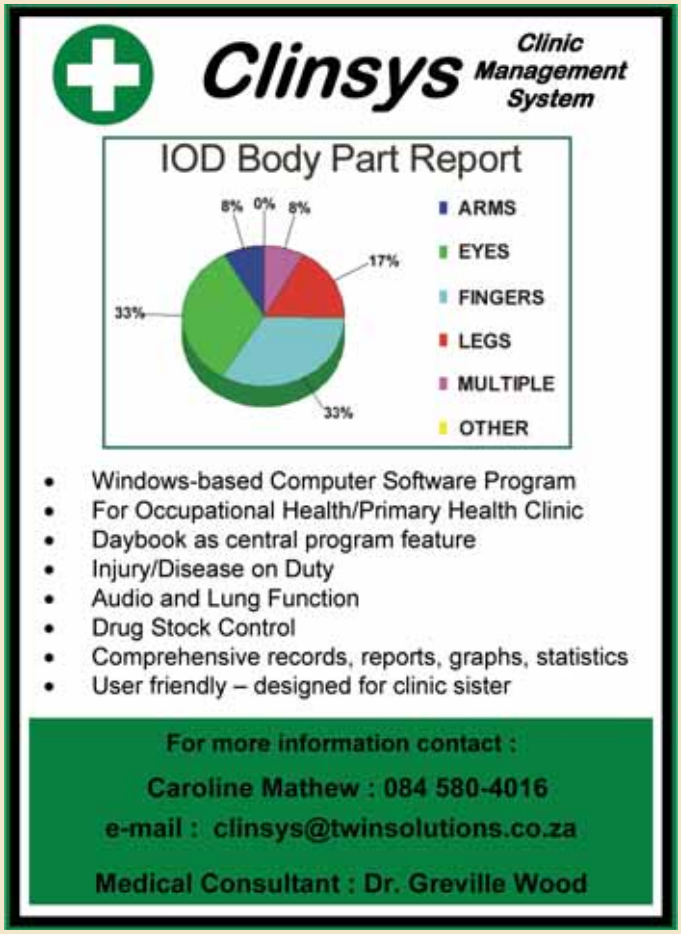
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