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On the doorstep to senility: physical changes, health status and well-being in midlife

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Abstract: The movement of the baby boomers into the middle ages made the 45–65 age cohort the largest and the fastest growing segment of population in the first decade of the 21st century. This demographic expansion will have multiple consequences for ageing society. This paper aimed to provide an overview on biology of midlife transition. Physical characteristics, midlife-specific morbidity and mortality were described with focus to sexual dimorphism in physique and gender gap in mortality and morbidity. These characteristics made midlife a separate and unique stage of life. In-depth knowledge of this life stage may be useful in identifying and solving problems of ageing individuals and population.

Key words: stage of life, menopause, andropause, morbidity, mortality, quality of life

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> *Thoroughly unprepared we take the step into the afternoon of life; worse still, we take this step with the false presupposition that our truths and ideals will serve us as hitherto. But, we cannot live the afternoon of life according to the program of life's morning—for what was great in the morning will be little at evening, and what in the morning was true will at evening have become a lie.*
>
> (Carl Gustav Jung, 1933:111)

Introduction

The latter part of the 20th century has witnessed the most dynamic world population growth in human history. During that time the world's population doubled from 3 billion in 1959 to 6 billion in 1999 and experienced both the peak growth rate averaging 2.04% per year in the late 1960s and the largest annual increment to world population (86 million people each year) in the late 1980s (UN 2015). The 21st century is expected to be one of comparably slower population growth than the previous century and to be characterized by declining fertility

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rates, more urban living and global population ageing with the worldwide increasing proportion of people above age 65 years from 6.9% in 2000 to 21% in 2030 (OECD 2015).

Current demographic trends indicate that there is a great diversity of demographic dynamics across the world. Some world regions (Africa and Arab countries) are still growing very fast, whilst others (Europe, East Asia and North America) are ageing rapidly, and some others (Eastern Europe) are already shrinking (OECD 2015). The demographic ageing is likely to be more advanced in highly developed countries than it is in their less developed counterparts. Driven by falling fertility rates well below replacement level and increasing longevity, Europe has become the second most rapidly ageing world region after Japan and the only one whose total population is projected to decline in the next few years (EU 2015).

In the ten years between 2003 and 2013, life expectancy in the EU-28 extended by 2.9 years, from 77.7 to 80.6 years reaching 83.3 years for women and 77.8 years for men with a gender gap decreased from 6.6 years in 2003 to 5.5 years in 2013 (EU 2015). The recent narrowing of the gender gap in life expectancy may be due to changing patterns of environmental and behavioural factors such as increased smoking and physical inactivity among women and falling rates of cardiovascular disease (CVD) among men (Oksuzyan et al. 2010). Because of women's longer life expectancy, older women generally outnumber older men. The 2013 European population comprised 53% of women aged 50 years or older and 59% of adults aged 70 and above (EU 2015).

The 45 to 65 segment of the European population grew rapidly between 2000 and 2015 rising the median age from 38 years in 2000 to 42.2 years in 2015, and by 2030 it is expected to reach 49 years. This age group now accounts for 25.8% of the total European population with the number expected nearly to double by 2030 (EUROSTAT 2015). The overall pattern of a progressively larger share of the 45–65 age group in the total population reflects both falling fertility rates over several decades and the impact of the post-war baby boom cohort on the

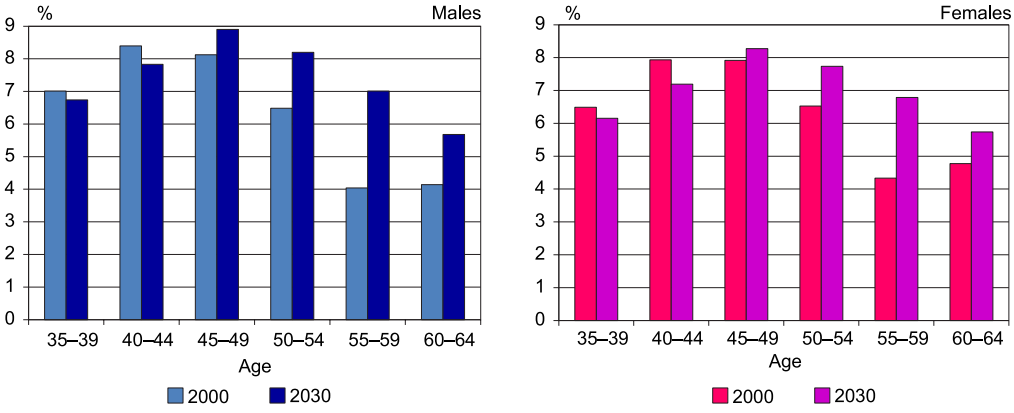

Fig. 1. The prognostic changes in the 35-65 segment of Polish population by sex and by five-year age category and their share in the total population
Source: OECD Statistics, 2015.

population structure. The movement of the baby boomers into the middle ages made the 45-65 age cohort the largest and the fastest growing group in the first decade of the 21st century.

It is well illustrated by an increase in population share of the 45–65 age segment in Poland in the 2000-2030 projection period (Figure 1).

The baby boom generation are projected to continue shaping the overall population in the coming years. They began turning 65 in 2011 and further population growth will be prompted by their aging. The share of people aged 65 years and over (they constitute two cohorts: the *young old* those aged between 65 and 74 years and the *old* people aged 74 to 84 years) in the total population will likely double by 2030 (14.7% vs 23.5% of the population in 2000 and 2030, respectively) (EU 2015). According to demographic projections, this shift toward an increasingly older population is expected to endure. By 2030, all of the baby boomers will have moved into the ranks of the older population, and those aged 85 and over (the *oldest old*) will number 9 million people. This will result in a profound shift in the shape and age structure of the population. The proportion of 85 and over will exceed that of children under 18 years of age (EUROSTAT 2015).

Population ageing poses major challenges, especially those supporting complex economic, technological, organizational, societal and health care efforts to integrate older people as active participants of societal development. However, people's optimal functioning in later life will depend largely on their previous experiences and in particular those during midlife, the life stage called by Carl Jung as the afternoon of life (Jung 1933:111).

All of these facts suggest the need for deeper insights into the midlife. The objective of this review paper was to outline main characteristics of the midlife from the perspective of biological anthropology and to gain a better understanding of the role the midlife plays in the later life.

Defining midlife as a stage of life

The two demographic changes, the decline in fertility and increase in human longevity, as well as the transformation in the economy and professional career paths have resulted in reconfiguration of life stages into more distinct stages of youth, early adulthood, middle age (midlife) and old age. Midlife, a period of transition from young adulthood to old adulthood, has emerged as a normative developmental period in the life course over the past half of the 20th century (Moen and Wethington 1999). It is defined as a socially constructed and culturally mediated life period delimitated by chronological, biological/physical/physiological and social/cultural time (Willis et al. 2010). The timeline of this period may vary according to average life expectancy, biological ageing and health outcomes, social life stage, and economic and cultural changes in the population. Although it is difficult to set precise ages when midlife begins or ends, typical cut-offs are 40 and 60 years (Green 2010).

Midlife represents physical changes associated with the process of ageing which is exemplified for women in the menopause transition and for men in the male andropause. This life stage also involves social opportunities and norms about appropriate roles, loss or threat of loss of control or mastery due to health

problems which can have important implications for both psychological well-being and self-efficacy (Green 2010). Unlike that of earlier life stage when resources are allocated to growth and later life when resources are allocated to regulation of loss, at midlife, the allocation of resources is primarily to maintenance and recovery, a balance of gains and losses (Wolański 2012). This tie in gains and losses in midlife is said to be its unique feature.

Physical changes during midlife

Ageing is a naturally developing biological process induced by complex interactions of genetic, epigenetic, environmental and stochastic factors (Williams 1957, Kirkwood 2005, Muñoz-Najar and Sedivy 2011). On population level it is characterized by decreasing survival and fecundity, and increasing mortality with advancing chronological age that would ultimately lead to death (Kaczmarek and Szwed 1997). Population ageing refers to the rising number and greater proportion of older individuals within the total population.

On the individual level it means a progressive and cumulative process involving a number of more or less random changes that occur over time at the molecular, cellular and tissue level which may disrupt some of the regulatory processes responsible for functional integration between cells and organ systems. Consequently, there is homeostatic dysregulation, diminished capacity for organ function and increased vulnerability to disease and stress (Kaczmarek and Szwed 1997).

The continuum of ageing experienced by a man and a woman throughout his/her life cycle affects his/her physical functioning. Age-related changes in cardiovascular system include decreased myocardial sensitivity to β-adrenergic receptor stimulation, decreased catecholamine sensitivity thereby the diminishing ability to respond to stress, decreased cardiac output, slower heart recovery rate, increased blood pressure and postural hypotension. There are numerous changes in the respiratory system such as increase in residual lung volume, decrease in vital capacity, decreased gas exchange and diffusing capacity, decreased respiratory muscle strength, chest wall compliance and maximal breathing capacity. Nervous system reveals reduced speed in nerve conduction and cerebral circulation, reduced weight and volume of the brain, alterations in cognition. Loss of skeletal bone mass (osteoporosis), loss of muscle strength and size, degenerative changes in joint cartilage are main signs of musculoskeletal ageing. Some general trends have been observed in body composition changes with ageing, including an increase in body weight and fat mass and a decrease in total body water, lean body mass and serum albumin. Gastrointestinal system is characterized by reduced motility, decreased salivation, delayed esophageal and gastric emptying. Ageing can also affect all of the senses (hearing, vision, taste, smell, touch) but usually vision and hearing are most affected. Typical changes include the decrease in visual and auditory acuity, diminished ability to discriminate colours, inability to tolerate the glare and difficulty in adjusting to light intensity. Ageing changes in the male reproductive system may include gradually occurring changes in testicular tissue, sperm production, and erectile function and those in the female reproductive system include a gradual loss of vaginal wall rugae,

length, and elasticity. There is also a progressive *decrease* with age in many parameters of endocrine and metabolic functions inlcuding decrease in growth hormone secretion (somatopause), decreased adrenal steroids (adrenopause), and decrease in gonadal steroids production (menopause, andropause). Both men and women gradually lose their sex drive (libido) but women are more likely to be affected by a decline in sex drive than men. As estrogen and progesteron hormone levels fall, and luteinising hormone (LH) and follicle stimulating hormone (FSH) increase, menstruations become much less frequent and eventually stop. This is known as menopause. Older women experience a weakening of the muscles of the bladder, detrusor instability (urge incontinence) and urethral dysfunction (stress urinary incontinence). Whereas enlargement of the prostate gland, often called benign prostatic hyperplasia (BPH), is a common effect of the ageing process in men (McDonald 2014).

Menopause

Menopause is a life-history trait that marks the end of a woman's reproductive life which occurs well before senescence of other physiological functions and long before reaching maximum life expectancy (Sievert 2014). A uniquely extended postmenopausal life is a human-specific feature, other primate species do experience a postreproductive period but the length of this period is very short and not necessarily related to the existence of menopause *per se* (Walker and Herndon 2008).

Physiologically, menopause is characterized by a permanent cessation of menstruation resulting from continuous depletion of a fixed number of primordial follicles, the great majority of which are lost due to atresia, leading to almost total depletion and loss of ovarian follicular activity in the female midlife (Gosden 1985). The clinical manifestations of menopause can be explained by decreased ovarian activity and the loss of the estrogen effects on cells of target organs, by alterations in menstrual cycle intervals, by a variety of symptoms, and by decreasing fertility until the irreversible loss of reproductive capacity (Sievert 2014a). Hormonal, i.e. estrogen, progesterone and inhibin deficiency due to the absence of follicles in the ovaries can cause obvious effects leading to acute symptoms such as alterations in bone mineralization (osteoporosis), hot flushes, sweating, mood swing, sleep problems (insomnia), heart failure, sexual functioning, vaginal dryness and dyspareunia and many others (Santoro et al. 2015).

In a lifespan approach, menopause is meant as a transition from potentially reproductive to post-reproductive (post-menopause and non-reproductive) stage of life associated with a variety of physiological and structural changes in ageing woman. The postmenopausal status is defined as amenorrhea for 12 or more consecutive months dating from the last menstrual period, for which there were no other obvious pathological or physiological causes for menses cessation (WHO 1981, NAMS 2010).

Within lifespan approach, menopause is more than biomedical process, it is a complex biosocial and biocultural phenomenon, which occurs spontaneously in a woman's midlife, typically between 45 and 55 years of age (NAMS 2010,). Worldwide variation in menopause age is shown in Figure 2. The average age es-

timates vary widely within and between populations and across different regions. In Asia and Africa, menopause is likely to occur at younger age as compared to Europe, USA and Australia. The corresponding figures are: 44.6 years in Indian women from Punjab; 48 years in Nigerian women; 49 years in Iran Shiraz; 51.2 years in Polish and 52.0 years in French women (Thomas et al. 2001; Kaczmarek 2007). Furthermore, the secular trend in the age at menopause was well demonstrated in Europe but there is inconsistency across data sources (Dratva et al. 2009).

The menopause age is likely to be associated with common diseases and, as such, may serve as an indicator of population health. There is epidemiologic evidence that menopause before age 45 years has an increased risk of ischemic heart disease, osteoporosis and overall mortality, whereas menopause after age 55 years is associated with higher risk of breast, ovarian, and endometrial cancers (Dossus et al. 2010; Wellons et al. 2012; CGHFBC 2012).

Age at menopause is a complex biological trait determined by multiple genetic, vascular and environmental factors. To date, more than 17 novel genetic loci have been identified in the genome-wide association study (GWAS) for age at menopause (He at al. 2010). The evidence indicates a role the IGF-pathway plays in the timing of menopause (He et al. 2010). Using a candidate-gene approach, Kaczmarek and colleagues (2015) revealed that genetic polymorphisms in the *IGF1* gene (a common cytosine-adenine (CA) microsatellite repeat polymorphism in the P1 regulatory region of the *IGF1* gene) may be an independent predictive factor for age at natural menopause also after adjusting for other exposure variables in multivariate modelling. The increased risk of the onset of natural menopause is associated with the absence of (CA)19, early menarche (prior to 12 years of age) and cigarette smoking.

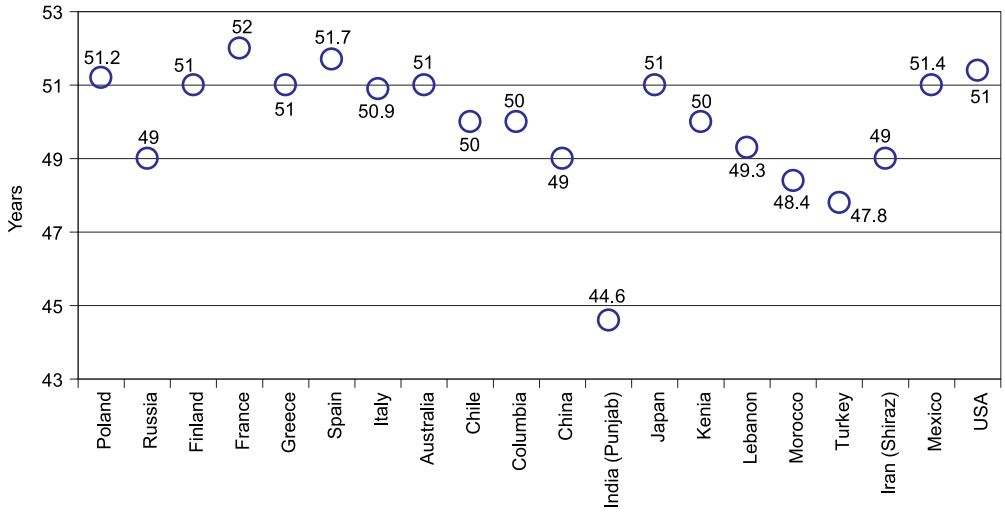

Fig. 2. Average age of menopause by selected countries

Population, twin and family-based studies suggest that the wide age range for menopause is most likely due to gene–environment interactions of many genes with widespread environmental exposures over the female lifespan. The heritability estimates range from 31 to 78 percent (Morris et al. 2011). Environmental factors which affect the timing of menopause include marital status, life-history traits, socioeconomic status and lifestyle behaviours (physical activity, smoking, drug abuse) and they are likely to explain only small part (ca 4%) of the total menopause age variation (Sievert Leidy et al. 2001; Bernis and Reher 2007; Kaczmarek 2007a; Gold et al. 2013).

Andropause

The term andropause (other terms include male menopause, male climacteric, and androgen decline in the aging male – ADAM) refers to *sets of symptoms* and signs that occur together with the age-related decline in gonadal function in men, namely reduced production of testosterone and dehydroepiandrosterone (DHEA) (Vermeulen 2000; Feldman et al. 2002; Stanworth and Jones 2008). Andropausal signs and symptoms include changes in sexual function (reduced sexual desire, problems achieving spontaneous erections, impotence), changes in sleep patterns (insomnia), physical changes (increased body fat, reduced muscle bulk and strength and decreased bone density) and emotional changes (weakness, fatigue, anxiety, irritability, depressive mood, trouble concentrating or remembering things) (Vance 2003; Kaczmarek and Skrzypczak 2009).

The timing of andropause is said to vary widely among individuals but generally begins in midlife. Additionally, the concept of male andropause is somewhat controversial. Men unlike women, perceive the reproductive capability and do not have a clear-cut external signpost that marks andropause. This is so because men experience a modest and gradual drop in sex hormone levels over a longer period of time and this process exhibit high degree of inter-individual diversity and differentiation (Kaczmarek et al. 2005). Menopause is a universal event in the lives of all women but not every man who goes through midlife experiences symptomatic decline in circulating androgen.

As it was stated, prevalence of androgen deficiency in men varies in different age. Clinical data indicate that a quarter of healthy men over the age of 50 and approximately 50% above the age of 60 have serum bioavailable testosterone levels that are below the normal range for men aged 20–40 years. By the age of 80, these hormone levels decrease to pre-puberty levels (Allan and Mclachlan 2004). Serum testosterone levels decline steadily after young adulthood. The decline can occur in men as young as 35 years of age, is gradual, with total testosterone levels dropping 1% to 1.6% per year whilst free testosterone by 2%, and bioavailable testosterone levels by 2% to 3% per year. The reduction in free and bioavailable testosterone levels is larger because a 1% to 1.6% annual increase in sexual hormone-binding globulin (SHBG), which becomes unavailable for the tissues (Feldman et al 2002).

Sex differences in physical functioning in midlfe indicate greater functional limitations for women than for men. The midlife weight gain is greater for women than for men and is associated with socio-demographic and lifestyle behaviour factors (Kaczmarek 2007b). Higher total

and subcutaneous fat mass and lower lean mass, muscle area and muscle density translate to worse physical performance among women than among men (Tseng et al. 2014).

Middle-aged women have 40% lower levels of strength, 20% poorer balance times and nearly twice the prevalence of self-reported difficulties with stair climbing activities than similarly aged men (Kuh et al. 2005). The loss of strength in men is linear across the lifespan whereas women experience accelerations in strength loss between ages 40 and 55, i.e. at menopausal transition (Danneskiold-Samsoe 2009). It has been hypothetized that ovarian failure and the consequent decrease in estrogen levels during the menopausal transition may be associated with poor functioning. Postmenopausal women have 3.5 times higher odds of reporting substantial physical limitations and 17% poorer balance times as compared to premenopausal women (Tseng et al. 2012). Generally, postmenopausal women tend to be of poorer physical functioning as compared to premenopausal counterparts (Kaczmarek and Lasik 2006).

Morbidity

The rising trends in unhealthy lifestyle behaviours (smoking, poor diet, physical inactivity and drinking alcohol), prevalence of obesity and an unprecedented upward shift in life expectancy have led to the exponential increase in chronic disease prevalence and multimorbidity. A growing number of people with multiple chronic diseases have been diagnosed earlier in life than ever before. It is a new trend since The US statistics have shown that the number of midlife adults with three or more chronic conditions increased by 9.7% between 1996 and 2005 (Karvonen-Gutierrez 2015). Furthermore, the reported male-female health-survival paradox has demonstrated that women are a particularly vulnerable group for disability problems. They outlive men but with greater total disability burden and moderate to severe disability as compared to similarly-disabled men (Karvonen-Gutierrez 2015).

Appreciable morbidity differences between the sexes have been found in common bone and joint diseases such as osteoporosis and osteoarthritis, both primarily affect women. Among middle-aged osteoporotic patients, 50% of women as compared to 25% of men will suffer an osteoporosis-related fracture. The devastating effects of this condition is that 20% of patients will die within a single year (Hrafnhildur et al. 2015).

For many adults, midlife is associated with increasing health problems although most physical changes which occur during this stage of life do not necessarily lead to disability. The prevalence of midlife disability increases from 7% of adults in their forties, 16% in the early fifties and 30% in the early sixties (WHO 2011; Karvonen-Gutierrez 2015). The overall prevalence of any kind of midlife disability has been reported to range from 20 to 40% worldwide (WHO 2011; Karvonen-Gutierrez 2015).

Quantifying disease burden in terms of disability-adjusted life years (DALY) is shown in Figure 3 by two age groups, the 30–49 years and 50–59 years and for each sex separately (OECD 2015). DALY is a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability. One DALY means one lost year of healthy life due to various conditions.

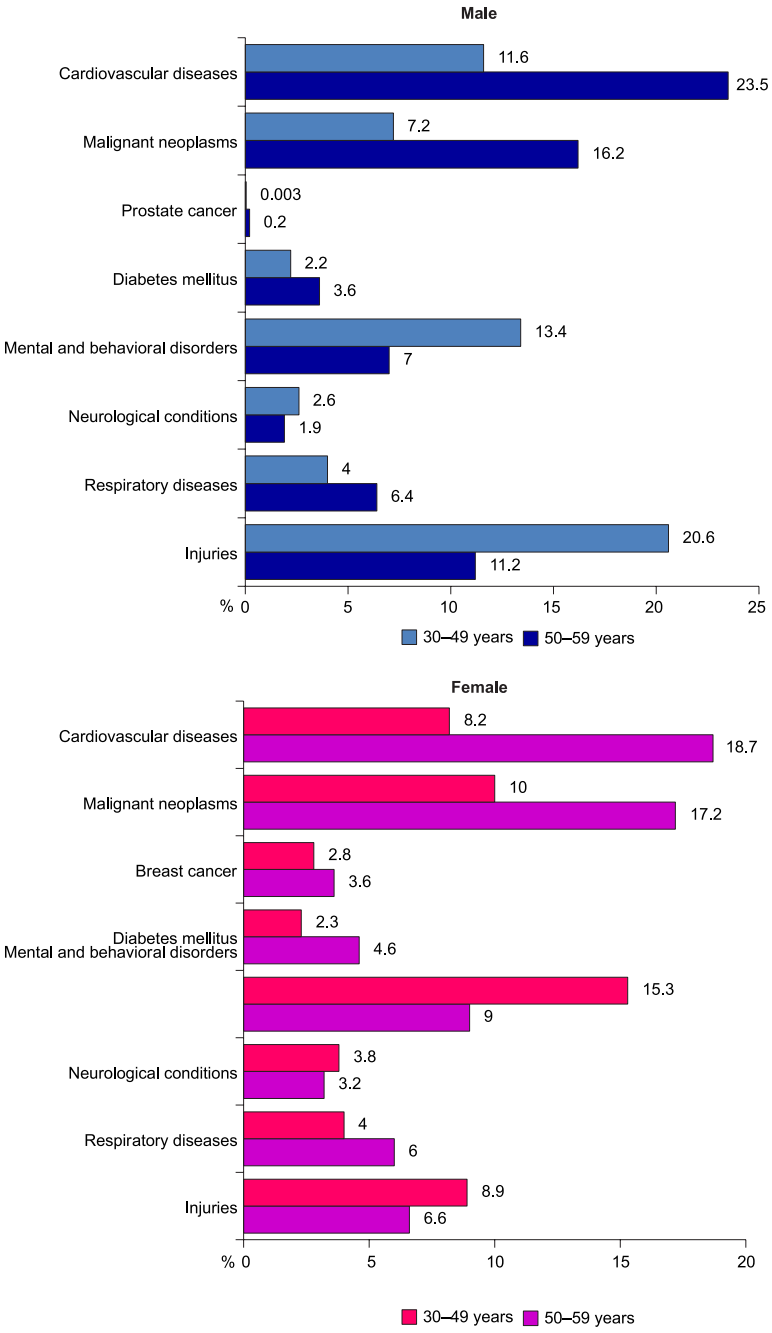

Fig. 3. Leading causes of burden disease (DALY) in midlife by sex and two age groups 30–49 years and 50–59 years. A. Men B. Women

Source: WHO methods and data sources for global causes of death 2000-2012. Global Health Estimates Technical Paper WHO/HIS/HSI/GHE/2014.7.

The DALY patterns in midlife men and women indicate that the top leading cause of health burden relative to all other causes both in men and women is cardiovascular disease (CVD). This condition accounts for more than twofold increase of people who lose their healthy life due to CVD in the 50–59 year age group as compared to the younger counterparts (11.6% vs. 23.5% and 8.2% vs .18.7% in younger and older age group of men and women respectively). Cancer is the second leading cause of health burden figured by 7.2% vs. 16.2% and 8.2% vs. 18.7% of men and women in younger and older age groups. Among women, breast cancer affects DALY of 2.5% of women prior to menopause or at peri-menopause and 3.6% of postmenopausal women (OECD 2015).

According to the WHO 2015 statistics, almost 20 million people die from CVD each year thereby confirming its number one cause of morbidity and mortality. Although sexual dimorphism in biology and disease epidemiology in midlife has well been established, the main health problems, as it was stated before, for both men and women worldwide are those of vascular system, including CVD and higher risk for heart attack (Barrett-Connor 2013). The morbidity pattern indicates that midlife men (35 to 54 years) have a higher prevalence of myocardial infarctions (MI) than similarly aged women. Also the risk for future heart attack remains higher in midlife men compared with midlfe women (Towfighi et al. 2009). However, men and women do not only differ in baseline CVD parameters but also in its clinical manifestation and time of diagnosis as well as treatment outcomes. Women tend to be diagnosed with CVD somewhat 7-10 years later in life than men and are more likely to die from MI than men (Towfighi et al. 2009). This sex-based differences in CVD pathophysiology have been primarily explained by estrogen loss during the menopausal transition. Estrogen is believed to have protective effects against coronary heart disease (CHD) and other atherosclerotic diseases. Most likely mechanism of this protection is through improvement of serum HDL concentration (is thought to carry LDL cholesterol away from the arteries and back to the liver) and improvement of endothelial functions. It seems however, that the explanation may be more complex than only that attributed to the loss of estrogen during the menopausal transition (Bhupathy 2010). Socio-economic status, social relationships, lifestyle behaviour such as smoking, drinking alcohol, lack of excercises, poor diet and obesity are just as important to health in midlife as biological risk factors.

Another health issue worth mentioning is that women differ from men in the timing and sympotms of angina pectoris suggesting its association with menopausal transition. The risk of this condition increases for women over the age of 55 (after menopause) and for men over the age of 45.

Men-women difference has also been found in the prevalence of stroke with women doubled this condition over the past two decades (WHO 2011). found Stroke is also serious condition in midlife for both men and women. It has been noted however a two-fold increase in prevalence of this condition in women as compared to similarly aged men. Over past two decades indicating worsening of women's health.

Recent data have indicated that gender gap in CVD has been narrowing over the past two decades due to the male-fe-

male opposing trends – increased prevalence of CVD in women and decreased in men (Towfighi et al. 2009). A two-fold increase has also been found in the prevalence of stroke in women compared with similarly aged men. These results suggest the role biological sex plays in cardiac pathophysiology and a relative improvement in health for men but not for women.

Mortality

Globally, the all-cause midlife mortality fell over the 25 year-period (GBD 2015). Despite recent decreases in mortality rates, three conditions – ischemic heart disease, stroke, and chronic obstructive pulmonary disease remained leading causes for premature death in 2013. Deaths from these three conditions together accounted for nearly 32% of all deaths (GBD 2015).

It is interesting to note a unique reversed trend in the all-cause mortality of middle-aged US white non-Hispanics was well documented for period between 1999 and 2013 (Case and Deaton 2015). In contrast to other high-income countries such as France, Germany, the United Kingdom, Canada, Australia, and Sweden, whites' midlife mortality increased over this time interval (see Figure 1 in Case and Deaton 2015). As claimed by Case and Deaton (2015:1), this all-cause mortality rate increase was largely accounted for by increasing death rates from drug and alcohol poisonings, suicide, chronic liver diseases and cirrhosis, and many others. Furthermore, individuals with the lowest level of education saw the most marked increases. Rising midlife mortality rates of white non-Hispanics were paralleled by increase in emotional midlife distress, especially among those with high educational attainment.

A similar phenomenon, socio-economic inequalities, premature mortality among adult Polish men and protective effect of marriage on mortality was found as early as in 1980s in Poland and this trend is likely to continue covering midlife women (Welon et al. 1999; Lipowicz et al. 2002; Lipowicz 2003; Wróblewska 2002).

There are numerous studies suggesting that certain health-related behaviours such as smoking, drugs, poor diet, physical inactivity are the leading root causes of death (Bandosz et al. 2012) as they are independent risk factors for poor health and disability in later life (Shaw and Agahi 2014).

As shown in Figure 4, the proportion of deaths among Europeans caused by CVD in 2013 was substantially higher than any other causes. Such data confirm that CVD is the most common cause of death in Europe. Indeed, CVD was the underlying cause of three out of every ten deaths of Europeans under age 65 and caused 42% of deaths among women and 51% of deaths among men of all deaths in 2013 (Nichols et al. 2014). Coronary heart disease (CHD) accounted for 20 and 21% of deaths among men and women respectively. The proportion of all deaths that were caused by stroke was 10% among men and 15% among women (Nichols et al. 2014).

Cancer was the next leading cause of death although it is primarily a disease of older people, those aged 65 and over. In midlife adults, lung cancer was by far the most common cause of cancer deaths accounting for 23% and 18% of all cancer deaths in men and women respectively (Nichols et al. 2014). The next most common cause of cancer de-

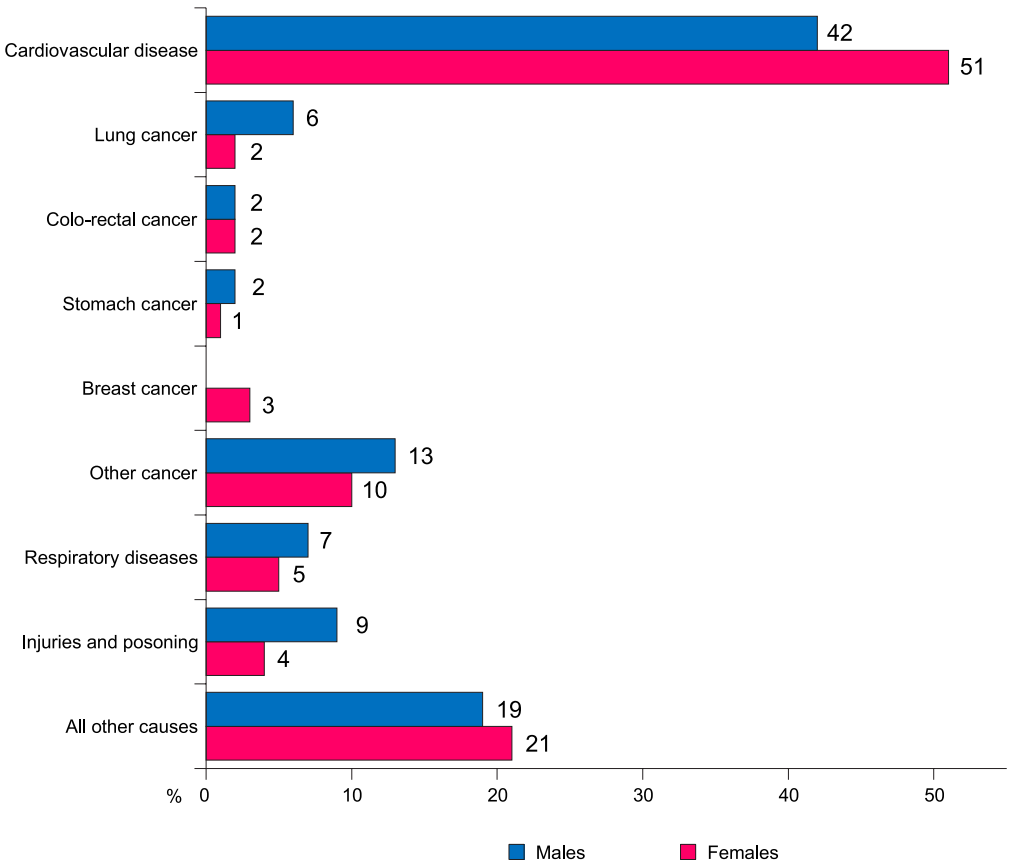

Fig. 4. Leading causes of death in midlife men and women
Source: GBD 2013 Mortality and Causes of Death Collaborators. 2015. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 385(9963): 117–171.

aths in men was prostate cancer responsible for 13% of all male cancer deaths and in women breast cancer accounting for 15% of cancer deaths (Nichols et al. 2014). Although much work has been done in an effort to achieve efficient cancer prevention, death rates from some cancers, including pancreatic cancer and kidney cancer has increased recently (Nichols et al. 2014). It means that cancer diagnosis and treatment remain a challenge.

Quality of life

Psychological well-being in midlife varies consistently among individuals in response to the subjective boundaries of this stage of life (Kaczmarek 2004). For some individuals, midlife means a transitional stage to old age (the afternoon of life as Jung said) and as such accounts for both changes and stability with both negative and several positive experiences including relief from the worry of pregnan-

cy, grandparenting, increased freedom when children leave home, opportunities to develop new skills and sometimes an improved marriage. For others however, midlife transition appears as a crisis – loss of self-confidence, feelings of anxiety, frustration and disappointment, drive for changes in career path or personal life (divorce) (Freund and Ritter 2009).

Kaczmarek and Skrzypczak (2002) in their population-based cross-sectional study on middle aged Polish men revealed that those aged 50-54 years, never married or partnered, living in urban settings, with low educational attainment were most dissatisfied with life as compared to similarly aged counterparts. Much dissatisfaction was felt due to loss of libido and emotional burden of midlife. The rank order of variables significantly associated with subjective well-being among midlife men were education on the top, followed by marital status and libido and last but not least was midlife emotional burden.

Another study on subjective well-being of Polish midlife adults revealed that gender and marital status were essential modulators of perceived satisfaction with life accounting for 29% of the total variation in subjective well-being (Kaczmarek 2004). The overall life satisfaction was evaluated as on medium level by both men and women. Men were likely to enjoy a significantly higher level of life satisfaction than did women, and partnered people fare better than their non-partnered peers on many life outcome variables. The midlife well-being appeared to be essential for later life as there was no statistically significant difference between middle-aged and older aged groups. There was a clear gender pattern of domain-specific life satisfaction, men were most satisfied with marriage and women with family. The rank order list for men included marriage, family, housing, health, work, friends, education, leisure time, standard of living, income and life in Poland, and that for women includes family, marriage, housing, friends, leisure, health, education and standard of living, life in Poland and income. Men are more likely than women to focus on more extrinsic variables (health, house, leisure time) whereas women are more intrinsic (family, marriage, house).

Similar trends in midlife well-being were found in many other studies (for detailed discussion see Kaczmarek 2004).

Health-related quality of life – the subjective assessment of the impact individual's health and functional status has on the ability to perform physical, psychological, emotional, cognitive and social functions in general (generic HRQoL) or in a specific disease (condition-specific HRQoL) varies consistently among middle-aged individuals in response to their health outcomes (Guyatt et al. 1993).

Although the decline in reproductive capacity differentiates men from women, both used to experience physical, sexual and emotional symptoms that occur around midlife and are referred to as climacteric symptoms. Experience of climacteric symptoms among women involves a complex interaction between physiological changes relating to aged reproductive system and ovarian hormone status or deficiency and sociocultural, psychological, and environmental modulators of menopausal transition and (Dennerstein et al. 2002). It has been reported that 40–80% of midlife women complain about climacteric symptoms. Common symptoms are hot flushes, sweating, palpitations, musculoskeletal system disorders, dysuria, increased urinary frequency, depression, insomnia

and vaginal disorders (Avis et al. 2005; Melby et al. 2005).

With regard to Polish women, Kaczmarek (2006) revealed that menopausal status *per se* was not a significant risk factor of psychological well-being but for health-related quality of life (HRQoL) was. Age at menopause and the onset of postmenopausal life appeared to be a critical event for experience of climacteric symptoms. The more frequent and severe climacteric symptoms the lower HRQoL (see Figure 2 in Kaczmarek and Skrzypczak 2012:99).

Inverse association between climacteric symptoms and HRQoL was statistically significant in both bivariate relationships and in multivariate modelling after controlling for variables such as marital status and education level. The study revealed relatively high prevalence of climacteric symptoms with hot flushes experienced most frequently.

In Figure 5, prevalence of hot flushes around the world is shown. It widely varies from 12.3% in Japanese women to 72.9% in Polish peers (Sievert et al. 2005; Kaczmarek 2006).

Women who had experienced an early natural menopause had a strongly raised risk of vasomotor symptoms (hot flushes or night sweats), sexual difficulties (vaginal dryness or difficulties with intercourse) and trouble sleeping (Kuh et al. 1997). However, there was little or no excess risk of other somatic or psychological symptoms. For vasomotor symptoms, postmenopausal women were almost five times more likely than their premenopausal counterparts with cor-

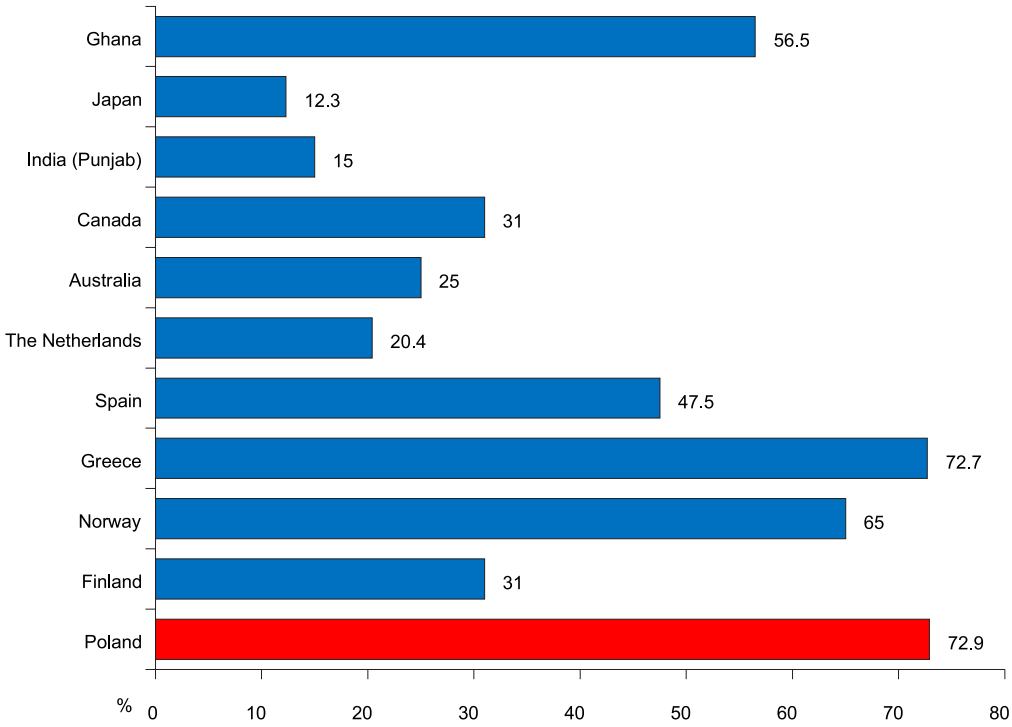

Fig. 5. Prevalence of hot flushes in women from different geographic areas

responding adjusted OR=4.7 (95% CI: 2.6–8.5). Corresponding adjusted odds ratios for sexual difficulties were 3.9 (95% CI: 2.1–7.1), and for trouble sleeping were 3.4 (95% CI: 1.9–6.2) (Kuh et al. 1997).

By contrast to objective health status which includes the set of diagnosed physiological and psychological conditions of an individual, the subjective health status is indicated by impairments in daily activities, functional limitation and a decline in life quality (Svedberg et al 2006). The subjective health status is believed to provide a better assessment of a person's future medical prospects than solely the objective health and to be a validated predictor of mortality (DeSalvo 2005).

In more recent study on perceived health status among middle-aged Poles from two population-based cross-sectional studies on andropause and menopausal transition (WOMID), Kaczmarek and Skrzypczak (2012) confirmed previous findings that marital status, educational attainment and financial well-off were the factors significantly associated with perceived health status in both women and men. The health perception in midlife was significantly associated with socio-economic status. This factor appeared to be stronger predictor of subjective health in midlife than biological/physiological status itself.

Conclusions

Midlife is a well-defined stage of human life, characterized by gradual decrease in physical functioning, increased morbidity and decreased quality of life. It is also a critical period for an individual's career paths and social roles.

There is clear sexual dimorphism in physical development during this stage of life modulated by factors from social and cultural settings. Women used to experience abrupt cessation of menses and reproductive period (menopausal transition) whereas men through 50s begin gradually decline in the reproductive capabilities (andropause/ADAM). Both menopause in women and andropause/ADAM in men are associated with experience in clinical symptoms and disease burden. These symptoms together with adverse health outcomes lead to worsening the health-related quality of life and psychological well-being and often to premature death.

In the final conclusion, it may be stated that in-depth knowledge of midlife may be useful in identifying and solving problems of ageing individuals and population.

Conflict of interest

The author declare that there is no conflict of interest regarding the publication of this paper.

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