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A Comparative Study of Health-related Fitness between Urban and Rural Postmenopausal Women – A Review

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Abstract

Background: Health-related fitness plays a pivotal role in improving the quality of life for postmenopausal women, yet significant disparities exist between urban and rural populations. Menopause signifies a pivotal transition in a woman's life, typically between the ages of 45 and 55, marking the end of menstrual cycles and the onset of various physiological changes that can significantly impact a woman's quality of life, making the maintenance of physical fitness particularly crucial during this stage. **Aim:** This review compares selected physical fitness parameters between urban and rural postmenopausal women. **Methods:** Extensive searches of electronic databases from Google Scholar, PubMed, PEDro, and Cochrane Library were performed between 2018 and 2024 to identify the relevant studies. Seven studies fulfilled the inclusion criteria for this review. **Results and Conclusion:** The findings reveal that urban women often suffer from obesity and metabolic disorders due to calorie-dense diets. In contrast, rural women are more prone to nutritional deficiencies and limited healthcare access. Rural women often demonstrate better cardiovascular endurance and muscle strength due to their labor-intensive routines, whereas urban women, despite better access to fitness facilities, face challenges stemming from sedentary lifestyles and high stress levels, adversely impacting their overall fitness levels.

Keywords: Health-related Fitness, Body Composition, Flexibility, Muscular strength, Postmenopausal women, Urban v/s Rural

1. INTRODUCTION

Menopause signifies a pivotal transition in a woman's life, typically occurring between the ages of 45 and 55, marking the end of menstrual cycles and the onset of various physiological changes (Lee et al., 2022). This period is often accompanied by symptoms such as vasomotor disturbances, sleep disruptions, fatigue, and heightened levels of irritability, anxiety, and depression (Smith-Ryan et al., 2023). These changes can significantly impact a woman's quality of life, making the maintenance of physical fitness particularly crucial during this stage.

Physical fitness plays a vital role in mitigating the adverse effects associated with menopause. Regular exercise has been shown to enhance physical, mental, and emotional health, potentially alleviating menopause-related symptoms and improving the overall quality of life for postmenopausal women (Brown & Wilson, 2023). Engaging in consistent physical activity can help prevent weight gain, reduce the risk of cardiovascular diseases, strengthen bones, and boost mood. For instance, aerobic exercises such as brisk walking, swimming, or cycling can help strengthen the heart and lungs, improving blood circulation and reducing the risk of hypertension and high cholesterol (Jegarajah & Shehan, 2024). Additionally, muscle-strengthening exercises are essential to countering the natural muscle mass loss that comes with age, contributing to better balance and mobility throughout the postmenopausal years.

The lifestyle and physical activity patterns of postmenopausal women can vary significantly between urban and rural settings. Urban women may have better access to fitness facilities, healthcare services, and organized exercise programs (Chen et al., 2022). However, they might also lead more sedentary lifestyles due to the nature of urban living, characterized by desk-bound jobs and reliance on transportation. In contrast, rural women may engage in more physical labor through daily activities such as farming or household chores, yet they often lack access to formal exercise facilities and healthcare resources. These disparities can lead to differences in physical fitness levels and health outcomes between urban and rural postmenopausal women (Ahmed & Farooq, 2023).

Postmenopausal and Health-Related Fitness

Postmenopause is the phase in a woman's life after menopause, which is defined as the cessation of menstrual cycles for 12 consecutive months (North American Menopause Society [NAMS], 2023). During this time, women experience physiological changes primarily driven by declining levels of ovarian hormones, including estrogen and progesterone, which play a vital role in maintaining bone density, cardiovascular health, and muscle function (Cheng et al., 2022). Additionally, hormonal fluctuations during this phase can lead to weight gain, changes in fat distribution (typically more visceral fat), and a reduction in basal metabolic rate (Gibbs et al., 2022). Postmenopausal women often experience a decline in muscle strength due to sarcopenia. This muscle loss can lead to difficulties in performing daily activities and reduced independence (Schrager et al., 2023). Hormonal changes and reduced physical activity levels contribute to stiffness and a decline in joint flexibility. This can affect mobility and increase the risk of injuries during physical activities (Zhu et al., 2023). Their cardiovascular fitness also declines due to reduced estrogen levels, which negatively affect heart rate regulation and vascular function. Women in this phase often report fatigue and reduced stamina during aerobic activities (Kim et al., 2022). Postmenopausal women often experience weight gain, particularly in the abdominal region, due to hormonal changes and decreased physical activity levels. This shift in fat distribution is associated with increased risks of metabolic syndrome and cardiovascular disease (Davis et al., 2023). The combined effects of muscle weakness, joint stiffness, and reduced balance significantly increase the risk of falls in postmenopausal women. Falls are a leading cause of fractures in this population, particularly among those with osteoporosis (Wang et al., 2023). These changes significantly affect their physical fitness, health, and overall quality of life, and heightened susceptibility to chronic diseases.

Health-related physical fitness can be defined as the ability to perform daily activities with vigor and energy that leads to a lower risk of diseases or chronic degenerative conditions associated with low levels of physical activity (de Souza Santos et al, 2010). The key components of health-related physical fitness

are (a) Muscular strength, (b) Muscular endurance, (c) Cardiorespiratory endurance, (d) Flexibility, and (e) Body composition (Caspersen et al, 1995). Understanding and improving health-related fitness is crucial for postmenopausal women to mitigate age-related physiological changes and enhance quality of life. However, previous research has evaluated physical fitness with some of these parameters in postmenopausal women but has not compared all the components of health-related fitness between urban and rural postmenopausal women. Further literature review is required for updating new research articles that have been published after 2011 to make this comparison. By analyzing existing literature, the review aims to identify differences in Health-Related Fitness levels between urban and rural postmenopausal women and assess the impact of varying physical fitness levels on health outcomes in this demographic. In addition, it will provide recommendations for interventions tailored to the specific needs of urban and rural postmenopausal women to improve their physical fitness and overall health.

2. METHODS

A detailed search of electronic databases Google Scholar, PubMed, PEDro, and Cochrane Library was conducted between 2010 and 2024. Articles were located using terms such as “Physical fitness”, “Postmenopausal women”, and “Urban v/s Rural”. Inclusion criteria were: i) articles with complete text; ii) articles should be written in English; iii) articles published between 2010 and 2024; iv) only postmenopausal women of age between 45 to 65 were taken as subjects; v) articles addressing the physical fitness and health in postmenopausal women; vi) articles in which at least one of the component of health-related fitness i.e. body composition, cardiovascular endurance, flexibility, muscular strength and endurance were taken as physical fitness parameters; vii) articles which include postmenopausal women of urban region or rural region or both; viii) all descriptive, prospective, observational, and cross-sectional studies. Excluded studies were: i) review articles and systematic reviews; ii) postmenopausal women of age above 65 years; iii) articles in which none of the components of health-related fitness, i.e, body composition, cardiovascular endurance, flexibility, muscular strength, and endurance, were not taken as physical fitness parameters.

The search has resulted in 80 articles; 60 were excluded (not within the proposed stipulated period and not fulfilling the inclusion and exclusion criteria). Out of 20 articles, 7 were excluded due to full-text unavailability, and the remaining 13 were included in the review. The characteristics of the included studies are given in Table 1.

Author	Type of Study (sample size)	Objectives	Results	Conclusion
Zubair H. et al (2024)	Cross-sectional study (106)	To assess the grip strength in urban post-menopausal women of varying socio-economic conditions	As age increased, a notable variation in grip strength was noted. Participants in the 50–54 age group had an average grip strength of 15.58 kg (SD = 3.95) for the non-dominant hand, but those in the 65–70 age group had a mean grip strength	These results demonstrate how aging affects muscle strength and how critical it is to manage this loss with focused health interventions meant to enhance

			of 11.03 kg (SD = 3.25; p = 0.003). Similar to this, the dominant hand's grip strength significantly decreased in the 50–54 age group, going from 17.27 kg (SD = 4.47) to 12.12 kg (SD = 4.65) in the 65–70 age group (p = 0.001). Grip strength was also examined according to socioeconomic status; however, no statistically significant difference in grip strength between the higher, middle, and lower classes was found.	postmenopausal women's quality of life.
Ajmera et al (2022)	Cross-sectional study (350)	To investigate and compare the health and fitness of postmenopausal women in urban and rural Gurugram.	The BMI, WC, and WHR of urban dwellers were shown to be more likely to be higher. Poor glucose metabolism, lipid metabolism, and cardiovascular risk factors are all closely related to obesity. Cardiac fitness varied significantly between urban and rural areas, with rural residents having higher VO2 max. Rural postmenopausal women scored much better on measures of upper and lower limb muscle strength. There were no noticeable differences in lower body flexibility.	Postmenopausal women who reside in cities may be at greater risk for developing hypertension, hyperlipidaemia, and MI. This study emphasizes the critical necessity for health promotion programs to improve the fitness and general health of postmenopausal metropolitan women. A lack of physical fitness can result in chronic illnesses

				and a lower quality of life.
Mahishale A. V. & KulkarniM. P. (2021)	Cross-sectional study (65)	To evaluate the muscle strength and cardiovascular endurance in postmenopausal women of Belagavi city.	There is a highly significant association between BMI and muscle strength in the gluteal muscles (p-value 0.001 for both sides) and the hamstring muscles (p-values of 0.0496 and 0.0523 for the right and left sides, respectively), both of which are less than 0.005. It was discovered that 64.06% of females had weak grip strength. A positive correlation was observed between grip strength and BMI, with the p-value 0.0141 and 0.0119 for right and left sides, respectively. Cardiovascular endurance was above average in (4.69%), high in (64.06%), and outstanding in (31.25%). Age and endurance level in postmenopausal women did not correlate.	Postmenopausal women have strong cardiovascular endurance but diminished upper and lower limb strength. BMI was strongly associated with handgrip, gluteal, and hamstring muscular strength, and the majority of the women had central obesity.
Agrawal et al (2020)	Observational Study (60)	To investigate the physical and cardiorespiratory fitness among the community-dwelling elderly rural population	The chair sit and reach test was used to measure flexibility, the average flexibility value in the 60-64 age group is -453±1.98 inches, which is lower than the typical mean values in the same age group. The 2-minute step test, which counts the number of steps, was used to	Reduced flexibility, balance, and endurance will make it harder to perform an activity, raise the risk of falling, and lower general fitness. So, it is recommended

			assess cardiovascular endurance. The average cardiovascular endurance value for the 60–64 age group is 60.4±15.25 steps, which is also lower than the typical mean values for that age group.	that older rural residents participate in physical fitness programs to enhance their quality of life and become more independent in their everyday activities.
Tapadar et al (2019)	Cross-sectional study (158)	To assess the CV disease risk by noting Blood Pressure, ECG changes, and BMI measurements in rural and urban post-menopausal women.	The urban population has seen a notably higher rise in the number of overweight and obese women as compared to those living in rural areas. Nearly 50% of the urban population is classified as overweight, with an additional 17% considered obese, which is a concerning revelation.	Being overweight greatly elevates the risk of HTN, which can subsequently lead to Ischaemic Heart Disease, if not properly managed
Koley & Neha (2019)	Cross-sectional study (802)	To assess the hand grip strength and various anthropometric measures among pre- and post-menopausal women of their urban and rural areas.	Postmenopausal women in rural and urban areas had statistically significant differences in body weight and BMI; the height vertex displayed the biggest variation, with rural women's BMI being higher than urban women. It was discovered that post-menopausal women living in rural areas had greater handgrip strength.	Rural postmenopausal women's mean hand grip strength values were substantially higher than those of their urban counterparts. Weak hand strength can result in several conditions, including osteoporosis, rheumatoid

				arthritis, and osteoarthritis.
Warsi et al (2018)	Cross-sectional study (190)	To explore the anthropometric indicators in pre and post-menopausal women.	In comparison to their urban counterparts, the rural postmenopausal group's mean weight, waist circumference, waist-to-height ratio, BMI, and biceps and triceps measurements were shown to be statistically lower; however, no such variations were detected in their mean height or age. The incidence of malnutrition and eating disorders may be linked to the lower BMI in our study's rural postmenopausal group (Choudry and Mumford, 1992). Conversely, we were unable to identify any correlation between females' pre- or post-menopausal status and biceps and triceps measurements. There was no significant difference in height or waist-to-height ratio (WHtR) between the abovementioned groups.	Post-menopausal women are shown to have lower anthropometric indicators (age, weight, BMI, and WC) than women who menstruate normally.
Karunakaran C. G. & Urooj A. (2017).	Cross-sectional study (443)	To assess the obesity status, nutritional status, and health practices of urban-employed pre-	All women more than 30 y of age had higher mean BMI and WC (25.3±3.9 and 80.3±15.5). Obesity risk was observed across all age categories, with grade I	Subjects over 30 years old, regardless of profession, showed lower protein status, a risk factor for

		and post menopausal women from various professions belonging to Mysore city, Karnataka state, India.	obesity being considerably greater (p=0.010) in the 40–49 age range and grade II obesity being significantly higher (p=0.001) in women over 50. WHR (> 0.80), a stronger indicator of central obesity, was found to be higher in women over 30.	CVD, and increased BMI, WHR, WC, and TSF. Even though post- menopausal women were more likely to be obese, it was unexpected to discover that premenopausal women shared similar characteristics, making them as vulnerable to CVD throughout the menopausal transition.
Mariam M. B. B.& Devi U. (2016)	Cross-sectional study (450)	To determine the association of waist circumference and body composition, energy intake, and expenditure pattern among urban postmenopausal women.	The majority of postmenopausal women fall into the obese grade I category (48%), followed by the obese grade II category (36%). Weight and BMI have statistically significant effects on obesity, whereas age at menopause has no effect. Obese people's waist circumference was much larger than that of non-obese people. Visceral fat levels and waist-hip ratio were found to be strongly statistically associated (p value <0.05). The majority of obese people had higher visceral fat	Obesity is strongly associated with increased visceral fat, decreased muscle mass, and a greater body fat percentage—all of which are risk factors for cardiovascular disease. The study's findings could help focus initiatives to support methods that lower postmenopausal women's risk of

			levels than non-obese people, which suggests fat deposition.	obesity and weight gain.
Kawatkar et al (2015)	Cross-sectional study (700)	This study aims to find and compare mobility, body mass index, and quality of life in urban and rural postmenopausal women.	The body mass index in the rural areas was within the usual range. On the other hand, the height, weight, and body mass index of postmenopausal urban women were higher due to their low level of activity concerning their nutritional intake. Compared to their urban counterparts, postmenopausal women in rural areas demonstrated more mobility as assessed by the timed up-and-go test.	Reduced bone mass density, which leads to osteoporosis, is also linked to a higher body mass index. Therefore, decreased mobility is the outcome of low bone mass density. The mobility of postmenopausal urban women will be perceived as being lower since their body mass index will be higher than the typical range.
Hsu et al (2014)	Cross-sectional study (408)	To investigate the relationship between different dimensions of health-related fitness and QoL in rural postmenopausal women of Taiwan.	An age-related decrease in body height ($P<0.05$) was observed. Agility, side-step evaluation, trunk extension, back and grip strength, and sit-ups were among the health-related fitness parameters that decreased with age ($P<0.05$). The step test, seated trunk flexion assessment, and closed-eye balancing test showed no differences	Age-related declines in health-related fitness are significant because they are linked to decreased functional mobility and a higher risk of falling due to postural misalignment, balance issues,

			between age-ranked groups. The physical aspect of QoL and health-related fitness decreased as people aged, whereas the mental aspect of QoL rose. Additionally, back strength was found to be the best predictor of the physical component of QoL among the dimensions of health-related fitness in postmenopausal women.	and strength/power loss. Consequently, a muscle-strengthening intervention may enhance quality of life and encourage older adults to continue exercising, which may reduce the age-related loss in fitness.
Daca et al (2011)	Observational Study (201)	To establish the relationship between bone mineral density (BMD) and body fat and fitness in urban post-menopausal women.	When using BMI as an indicator, the prevalence of overweight is 35.8% for the urban sample against 14.2% for rural, while obesity was 52.6% and 9.4%, respectively. When waist circumference was used, subjects at risk were 66.3% for urban and 9.4% for rural. Finally, the fat percentage calculated by DXA indicates an excess of fat in 97.9% of urban subjects and 43.4% of the rural sample. Women from rural areas showed notably superior performance compared to women from urban areas in assessments of flexibility, strength, and CV endurance.	Women in rural areas who are physically fit experience a greater prevalence of osteoporosis and osteopenia, likely due to their inadequate nutrition and lower levels of fat.

Tandon et al (2010)	Cross-sectional study (500)	To investigate the conventional cardiovascular risk factors that are prevalent in rural post-menopausal women.	It was observed that 78% of post-menopausal women had a BMI of 25 kg/m2. 68% of females had truncal obesity with a WHR > 0.8, whereas 60% had abdominal obesity with a waist size > 88 cm.	Obesity along with diabetes, hypertension, and dyslipidemia, are substantial cardiovascular factors for post-menopausal women living in rural settings.

Table 1: Characteristics of included studies

3. Discussion

Menopause is a condition in which there is a depletion of ovarian function followed by cessation of menstruation in women. Post-menopause is the phase after menopause. This review compares the components of health-related fitness between urban and rural postmenopausal women. The difference in these parameters between the urban and rural populations is apparent in all studies included in our review, with statistically significant findings in some of the studies. Physical fitness encompasses various components that contribute to overall health and functional capacity. In a study by Kwatkar et al (2015), it was observed that women with higher body mass index showed less mobility and a lower quality of life. Although there was less mobility among urban dwellers, their quality of life was higher than that of rural dwellers. On the other hand, rural women were found to have a lower body mass index than metropolitan women**.**

Physical and cardiorespiratory fitness was tested among the community-dwelling elderly rural population in a study conducted by Agrawal et al. At any age, maintaining the optimal level of physical fitness is crucial. Age-related declines in physical fitness are unavoidable; as people age, their physical ability and fitness decline. In this study, the balance was tested by using the foot up and go test and measured in seconds; the chair sit and reach test tested the flexibility and measured in inches, and the endurance was tested using a 2-minute step test, which was measured in steps. Due to the deterioration of their sensory systems, older persons are less able to adjust to changes in their surroundings and stay balanced. As a result of menopause, a lack of estrogen can lead to physiological deterioration, particularly a decrease in bone mineral density (BMD), muscular mass, and strength. The primary cause of balance issues is postmenopausal osteoporosis, which is one of the contributing causes. The decrease in flexibility was observed relative to its usual value, which might be caused by metabolic changes in the muscles and mitochondrial DNA deletion. In this study, a decline in the average endurance value relative to the baseline was observed. This happens as a result of the lungs' declining capacity for respiration, muscular atrophy, the heart's diminished capacity for cardiac muscle contraction, and a drop in oxygen intake, all of which cause weariness and a reduction in endurance as people age. The findings run counter to another study by Mahishale & Kulkarni (2021) that used age-adjusted standards and the step test to measure cardiovascular endurance. The majority of the women in the study were found to have sufficient cardiovascular

endurance, which may be explained by the fact that they were not sedentary and that the amount of physical activity they engaged in daily at work or home encouraged them to stay physically fit.

Another study by Ajmera et al. evaluated the physical fitness of postmenopausal women in urban and rural areas. For body composition, measurements were taken of the hip, waist, and BMI. The six-walk distance test (6MWD), sit and reach test, chair squat test, and grip test were used to assess cardiovascular fitness, flexibility, and upper and lower limb strength. In every test except the sit and reach test, postmenopausal women from rural regions performed better, indicating statistically significant differences between postmenopausal women in rural and urban settings. This disparity may result from the rural population's more strenuous and physically demanding lifestyle.

A lower hormone estrogen level in postmenopausal women was also found to be linked with lower handgrip strength, suggesting that, in addition to anthropometric considerations, women's hormonal state also influences handgrip strength. The impact of urban and rural habitat on the handgrip strength of pre- and post-menopausal women was highlighted by the fact that statistically significant differences in body weight and BMI were found between post-menopausal women in rural and urban areas, but not in handgrip strength. (Neha & Koley). These results are in line with different studies that found a positive correlation between grip strength and age and body mass index. Aging and a decline in physical activity may be the cause of the poor grip strength seen in most women. (Mahishale & Kulkarni; Zubair H). However, there was no correlation found between socioeconomic circumstances and grip strength. There may not have been a significant correlation between socioeconomic class and grip strength because of the limited sample size and the individuals' similar access to healthcare and overall living circumstances in Bahria Town, Lahore. (Zubair H). The strength of the gluteal, hamstring, quadriceps, and calf muscles as well as the abdominal and back muscle groups, was examined in postmenopausal women to identify the lower limb muscle strength, and the results showed that the strength was below the normative standards. (Mahishale & Kulkarni)

The prevalence of osteopenia and osteoporosis was found to be substantially greater in rural females than in urban females. In contrast, the rural women had lower BMD, despite being noticeably leaner and fitter. However, they performed better in all physical fitness tests, which were assessed by the Rikli & Jones Test Battery. The different results observed for body fat and physical fitness may be associated with extreme differences in their health, sanitary conditions, and lifestyle.

One hypothesis is that the rural women in this research are thinner because of their restricted availability of nourishment in addition to their exercise levels, which may have a detrimental effect on BMD. (Daca et al)

Nearly half of urban dwellers are overweight, and 17% are obese. However, the prevalence of overweight and obesity in rural regions is 20% and 1%, respectively. This might be explained by the fact that rural women engage in more physical activity and may have lower nutritional quality. (Tapadar et al). According to a different survey, the majority of postmenopausal women in metropolitan areas fall into the obese I and II categories. One possible explanation for this high incidence is that ovarian hormone decline after menopause causes a variety of functional and endocrinological abnormalities, including weight gain and a drop in basal metabolism. The impact of estrogen receptor activation on body weight regulation is

another element. Because estrogen receptor-α, which is activated by estradiol, plays a critical role in preventing adipose tissue growth, adipose tissue increases during menopause due to an estrogen shortage. The ability of skeletal muscle to use substrates after menopause is further impacted by postmenopausal women's reduced energy expenditure and fat oxidation during exercise compared to premenopausal women. (Mariam & Devi). In another study by Warsi et al, BMI is the variable that is found to be associated with age at menopause: higher BMI results in a delay in menopause. However, no such correlation exists between bicep and triceps measurement with the pre- or post menopausal status of females. Similar findings were seen when age-related declines in health-related fitness, such as endurance, muscular strength, flexibility, and agility, were noted. (Hsu W. H. et al).

However, there is not much research on this demographic, and the causes of the disparity in health-related fitness between urban and rural areas have not been thoroughly determined. Although this issue has been the subject of some studies, the contributing factors to this variation appear to be differences in lifestyle, dietary and nutritional habits, physical activity levels, and individual behaviors (such as smoking, drinking, and leading a sedentary lifestyle) that have arisen as a result of rapid urbanization and economic growth in the urban sector. (Kawatkar et al., Ajmera et al.). According to a different study by Neha and Koley, these disparities were most likely caused by factors that are primarily linked to the normal aging process, such as low dietary intake, decreased physical activity, uncontrolled fertility, poor evaluation of health services, illiteracy, malnutrition, and declining food quality and quantity with age. In post-menopausal women, decreased estrogen hormone levels were likewise linked to poorer muscular strength, as was the case with age progression. This suggests that the hormonal state influences muscle strength in addition to anthropometric considerations. It was further speculated that there could be underlying causes for the disparity in physical fitness between urban and rural areas.

Conclusion & Recommendations

This review comprehensively examined the selected physical fitness parameters and associated challenges faced by postmenopausal women in urban and rural settings. It is evident that physical fitness plays a crucial role in enhancing the quality of life for women during postmenopause, yet significant disparities exist between urban and rural populations.

One of the key findings is the variation in physical fitness parameters, such as cardiovascular endurance, muscle strength, flexibility, and body composition between urban and rural postmenopausal women. Rural women often demonstrate better cardiovascular endurance and muscle strength due to their labor-intensive daily routines. However, they face limitations in flexibility and access to structured fitness resources. Conversely, despite having better access to fitness facilities and healthcare, urban women often lead sedentary lifestyles, adversely impacting their overall fitness levels.

These disparities in physical fitness between urban and rural postmenopausal women underscore the urgent need for targeted interventions. Addressing these differences is critical to ensuring equitable health outcomes for all women, regardless of their geographic location. Urban women need support overcoming sedentary habits and incorporating regular physical activity into their routines. On the other hand, rural women need improved access to healthcare, education, and structured fitness programs to address their unique challenges.

Bridging this gap requires a multifaceted approach that includes creating awareness, improving access to resources, and promoting culturally sensitive fitness initiatives. Governments, non-governmental organizations, and healthcare providers must work collaboratively to design interventions that address the specific needs of both urban and rural populations.

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