Heat wave in the climate crisis: the corresponding policies for vulnerable groups in shanty towns in Korea and China

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Abstract

This study looks at the problems caused by heat waves in the midst of the ongoing climate crisis, with a specific focus on vulnerable people living in shanty towns in South Korea and China. These communities have cramped, poorly ventilated living conditions and are especially at risk from the negative effects of extreme heat. The goal of this study is to evaluate current welfare policies and emergency response strategies, find any gaps, and suggest improvements to better protect these at-risk groups. The existing measures often aren't enough to meet the unique needs of shantytown residents and lack persistence. By comparing China's and South Korea's relevant policies, this study offers suggestions for how shanty towns can be developed in the future.

Key words: climate crisis, heatwaves, vulnerable populations, welfare policy, shantytown

I. Introdouction

As the global climate crisis gets worse, heat waves are becoming more frequent and intense due to the urban heat island effect that particularly affects urban areas. Heatwaves create serious challenges for both the health and infrastructure of city dwellers, especially those living in slums. These vulnerable populations face greater risks because they live in crowded conditions with limited resources. This study aims to explore what policies and measures South Korea and China have put into place to deal with how heat waves affect slum dwellers' lives while also evaluating their effectiveness and identifying areas for improvement.

II. Research significance

Back in 1979, the National Academy of Sciences gave us a heads up about global warming, and in 1988, James Hansen from NASA told Congress that "Global warming is here." Since then, we've gathered a ton of scientific data on global warming, showing us just how urgent it is to come up with solid plans for dealing with heatwaves (Archer and Rahmstorf 2010:9).

1. Disaster Vulnerability

Vulnerability means being easily affected or harmed by certain risks. It's when a system or person doesn't have much

capacity to handle or recover from harm or damage (Cutter, 2002). Understanding vulnerability is key for figuring out how to respond to disasters and coming up with effective plans for reducing their impact (Blaikie, Cannon, Davis & Wisner, 1994).

There are lots of reasons why someone might be vulnerable - like not having access to information or technology; lacking political power; having limited social connections; living in old buildings; being physically frail or disabled; and having poor infrastructure (Cannon, 1994; Cutter, 2002). Ultimately though, vulnerability comes down to the social environment around us - managing it means understanding these relationships (Cannon, 2000; 2002).

2. Vulnerable Groups in Disasters

In Korea, the "Basic Law on Disaster and Safety Management" defines "vulnerable groups in disasters" as people who are especially at risk during disasters, like kids, older folks, and those with disabilities (Kim, Park & Chae, 2020). But we all know that when it comes to disasters, there's a whole lot more to consider than just age or ability (Sim, Park & Jeong, 2010).

According to Terry Cannon (1994), vulnerability can be broken down into three parts:

Livelihood Resilience: This is about how well individuals or groups can bounce back from tough times - including financially. It's all about their ability to rebuild their lives when things go wrong.

(2) Health Factors: This covers everything from an individual's health status to the medical care they have access to. How healthy someone is and what kind of preventive care they get can make them more vulnerable.

(3) Preparedness Level: This one depends on how much protection is available in a risky situation. It's all about how ready people are for potential risks and how well they can protect themselves. Not having enough money often means not being able to secure safe homes and living conditions - which makes certain groups even more vulnerable."

Later on, Terry Cannon (2000; 2002) took this idea a step further and added in political and social factors that can make people more vulnerable. He broke it down into five parts:

Initial Conditions: This covers things like physical and mental health, getting around, being independent, having enough to eat, and knowing how to survive. For women, things like nutrition levels can affect how well they can handle disasters, and being pregnant or breastfeeding can make them even more vulnerable.

(2) Livelihood Resilience: This is about how quickly and easily people can get food and what they need to live or go back to work after something bad happens. Women who have damaged homes or are staying in temporary shelters might have a harder time getting back on their feet.

(3) Opportunity for self- protection: This is all about whether you have a safe place to stay when something goes wrong, like a sturdy building. If you don't have much money, it's tough to find a safe home or living situation – which makes things even worse for women.

(4) Access to social protection: This is about how much people use the help that's available outside of their own home. When women aren't treated fairly in group shelters or when disaster relief efforts don't think about what women need, it

makes them even more vulnerable.

(5) Social Capital: This includes stuff like family members, neighbors, and groups in the community that you can turn to for support when things get rough. Women often don't have as strong of connections with others as men do – so during disasters they mostly rely on public organizations for help; but sometimes it's hard for them to connect with these groups or get information from them.

In conclusion, how vulnerable a community is to disasters depends on a bunch of things like how strong they are, their access to medical care and health services, what kind of protection measures are in place, the starting point they're at, their livelihoods, opportunities for self-protection, access to help from society, and the connections between people. These factors can be especially tough for women in poorer areas when you look at it from a gender perspective.

3. Global Climate Change and the Escalation of Heatwaves

Global warming has totally made heatwaves happen more often and be way more intense, especially in cities (IPCC, 2018). The stuff we've been doing since the 1950s has pumped a ton of greenhouse gases into the air, making heatwaves happen more often and be even stronger (Archer & Rahmstorf, 2010). And because of the urban heat island effect, cities are even hotter than the countryside, making heatwaves there even worse. Experts say that in the next few decades, heatwaves are gonna get even more frequent and extreme all over the world. It's gonna be a huge challenge for city management and public health (Kim, 2023).

Heatwaves really put a strain on city stuff like electricity and water systems and they're super bad for people's health. When it's crazy hot outside, people can get heatstroke or have heart problems - especially older folks, kids, and people with chronic illnesses (Song ,2013). Dealing with these health issues not only puts pressure on hospitals but also messes with how stable our cities are socially and economically. So yeah... dealing with all this heatwave stuff because of global warming is a major job for big cities everywhere (Lee ,Cho & Lim ,2014).

4. High Risks in Shantytowns

Poor neighborhoods are at high risk during heatwaves because of their specific social and economic conditions. These areas are usually home to low-income families who live in crowded spaces and lack basic things like air conditioning, fans, and proper medical care (Yang et al., 2023). On top of that, the buildings in these neighborhoods are often not well-built, with bad insulation and ventilation, which makes it hard to keep cool during the summer.

Because of money problems, people in poor neighborhoods can't afford things like air conditioners or making their homes better. Some families try temporary fixes like taking cold showers or going to public places for relief, but these don't always work when the heat lasts a long time. Also, the infrastructure in poor neighborhoods—like electricity and water systems—gets overloaded during heatwaves, which makes life even harder for residents and puts their health at risk (Jo et al., 2018).

People in poor neighborhoods tend to have worse health with more chronic diseases, so they're more vulnerable to extreme heat. Heatwaves don't just hurt people's bodies directly—they also make life more expensive and stressful by raising household costs and cutting down on job opportunities. That's why dealing with heatwaves in poor neighborhoods is different from other places—it needs special policies and actions to help out (Kim,Park & Son ,2021).

□. Research and Policy Responses in South Korea and China

1. Policies and Measures in South Korea

When it comes to dealing with heatwaves, South Korea has some pretty cool strategies. They use heatwave alert systems to warn people about the hot weather before it hits, spreading the word through media and government websites. They also set up designated cooling centers for vulnerable groups like old folks and kids, offering free access to air conditioning in community centers and libraries.

But that's not all - they've also installed public spray cooling facilities in urban areas, using water sprays to bring down the temperature. These are mainly found in parks, squares, and bus stations so that everyone can chill out when things get too hot. And if you're low on cash, no worries - the government teams up with non-governmental organizations to hand out fans and air conditioners to families who need a little help staying cool.

Even though these efforts do make a difference during heatwaves, there are still some challenges. Some remote areas and low-income families might not get the cooling equipment or services they need quickly enough, which can put their health at risk when temperatures soar. So it's important for South Korea to keep improving their policies so that more people can stay safe when things heat up.

2. Policies and Measures in China

So, China is doing some cool stuff to deal with heatwaves. They're planting more trees and creating more green spaces in cities, which helps to cool things down naturally. And it's not just about the temperature - having more greenery also makes the air cleaner, so people can breathe easier (Gu & Tong, 2023; You, Kim & Kim, 2019).

They're also fixing up shantytowns to make them better places to live. The government is spending a lot of money on tearing down old buildings and putting up new ones, as well as improving things like water and electricity supplies. Plus, they're adding more public facilities for everyone to use. All these changes are making it easier for people living there to handle the hot weather and stay healthy (Li, 2004).

On top of all that, the government is teaching people how to protect themselves from the heat. They hold talks and hand out info about staying safe when it's really hot outside. People are encouraged to stay indoors during peak temperatures, drink plenty of water, and use sunscreen. These efforts have definitely helped folks become more aware of how to take care of themselves in extreme heat - which means fewer health problems overall (Huang et al., 2018).

However, China is facing some challenges when it comes to putting these policies into action. The funding distribution

is uneven and the management efficiency is low. As a result, some shantytown redevelopment projects are moving slowly, which means that residents have to wait longer for better housing conditions. On top of that, it's tough to carry out large-scale urban greening projects in crowded city centers, which makes it harder to make cities greener (Yang et al., 2023). So, China really needs to improve how they implement and manage these policies in order to make sure things run smoothly and more people can benefit from them (Xie et al., 2015).

3.1 Impact of Heatwaves on Shantytowns in China

Living in informal settlements in China is tough, especially during heatwaves. The buildings are packed close together and there's hardly any greenery around, which makes the hot weather even more unbearable. It's really hard to stay cool and the health risks go way up.

Inadequate Infrastructure and Housing Conditions

The houses in shantytowns are not great – they're poorly built with bad ventilation, so they trap heat inside. When it gets crowded, the airflow is limited and it just gets hotter inside (Gu & Tong, 2023). Plus, the materials used to build these homes are cheap and don't keep out the extreme heat very well (Yang et al., 2023).

Limited Access to Cooling Solutions

People living in informal settlements often struggle to find ways to stay cool. Air conditioning, which is a common way to beat the heat, is usually too expensive or hard to come by. This means that residents have to rely on temporary fixes like fans, but they don't work well when it's really hot. On top of that, there aren't many green spaces or trees around to naturally cool things down outside (You, Kim & Kim, 2019).

Health Implications

Heatwaves can seriously affect the health of people living in shantytowns. Being exposed to high temperatures for a long time can lead to heat exhaustion, heatstroke, and other heat-related illnesses. Older folks and kids are at even higher risk. Plus, it's tough for residents in these areas to get medical help quickly during extreme heat because there aren't many healthcare facilities nearby (Huang et al., 2018).

Socioeconomic Factors

How much money people have plays a big part in how vulnerable they are during heatwaves in shantytowns. Limited financial resources mean they can't make long-term changes like getting better housing or air conditioning. And these communities often don't have the social services and support systems needed to deal with and recover from extreme weather events effectively (Kim, Park & Son, 2021).

Government and Community Responses

Dealing with these challenges involves the government doing stuff to make shantytowns better. Some programs are about fixing up the buildings so they can handle the heat better, while others are about moving people to nicer places. Also, there's talk of setting up cool places for people to go during heatwaves (Lee, Cho & Lim, 2014).

Overall, the impact of heatwaves on shantytowns in China shows that we really need some good plans to help these communities deal with extreme heat now and in the future (Li, 2004).

3.2 Government Policies in South Korea

The South Korean government has put in place a bunch of policies to deal with the impact of heatwaves, focusing on raising public awareness, improving emergency response, and making long-term infrastructure improvements (Kim, Park & Chae, 2020). Some key measures include:

1. Heatwave Alert Systems: South Korea has set up a nationwide heatwave alert system to give timely warnings and guidance to the general public. The Korea Meteorological Administration keeps an eye on the weather patterns and sends out alerts to help people get ready for extreme heat events (Shin, Lee & Cho, 2015).

2. Public Cooling Facilities: To help deal with the immediate effects of heatwaves, local governments create cooling centers like air-conditioned community centers, libraries, and public buildings. These places are open to everyone and provide a cool escape from the heat, especially for at-risk groups like elderly folks and low-income residents (Song, 2013).

3. Health Protection Measures: The government promotes health guidelines aimed at preventing heat-related illnesses. These guidelines include campaigns promoting drinking plenty of water, wearing light clothes, and avoiding outdoor activities during the hottest parts of the day. They also suggest using places like shopping malls or movie theaters as cool hangout spots (Lee Shin & Kim 2016).

4. Worker Protection Policies: After the 2018 heatwave hit Seoul hard,policies were put in place to protect outdoor workers.For example,in Seoul employees can take breaks duringthe hottest times without losing wages.This is meantto prevent workers from getting overheated or sufferingfrom sunstroke(Cho&Lee ,2018)

□. Evaluation of Policy Effectiveness

While these policies have offered some relief, there are still deficiencies in their implementation and effectiveness.

1. **Limited Reach of Cooling Centers:** Cooling centers are helpful, but not everyone can easily get to them because they might not be available in every area. Some people, especially those who really need it, might not even know about these centers or be able to use them (Kim, Park & Chae, 2020).

2. **Inequitable Support:** People who are already struggling, like the homeless and low-income families, often don't get enough help. Homeless folks are at serious risk during heatwaves and rely on emergency shelters that might not always be there or be enough (Song, 2013). It's super important to make sure these vulnerable groups get the support they need to stay safe during extreme weather.

3. **Workplace Implementation:** Government workers have rules to protect them from the heat, but private companies don't always follow the same standards. This means that workers in private businesses could be exposed to dangerous conditions when it's really hot outside" (Cho & Lee, 2018).

Awareness and Education: We really need more education for everyone about getting ready for heatwaves. There are some general guidelines out there already, but we gotta keep teaching people so that everyone knows what risks there are and how to take care of themselves (Shin ,Lee & Cho ,2015).

South Korea has done some good things with their policies and public places for dealing with heatwaves but they still need to do more so that everyone is covered better - especially those who really need it (Yang & Yoon ,2019).

□. Response Strategies in China

In China, they've come up with a few ways to deal with the impact of heatwaves, like making cities greener, improving housing in shantytowns, and teaching people about how to stay safe during extreme heat (Gu & Tong, 2023). These measures are all about making cities stronger and keeping people safe when it gets really hot.

1. Urban Greening: One way they're tackling the problem of urban heat islands is by adding more green spaces in cities. They're planting trees, building parks, and even creating green rooftops and walls. This helps cool things down by letting water evaporate from plants and providing shady spots for people to hang out. It's all about making cities more comfortable when it's scorching outside (You, Kim & Kim, 2019). For example, places like Beijing and Shanghai have been investing a lot in expanding their green spaces as part of their plans to deal with climate change (Yang et al., 2023).

2. Improving Housing Conditions in Shantytowns: 2. The Chinese government has been working hard to make living conditions better in shantytowns. They're upgrading buildings, adding better insulation, and making sure homes have good ventilation. The goal is to keep indoor temperatures down and make life better for people when it's super hot outside. Programs like the Shantytown Redevelopment Project have been really important in giving people new homes or fixing up their old ones so they can handle the heat better (Li，2004).

3. Public Education and Awareness Campaigns: 2. In China, they're really focused on making sure everyone knows how to handle a heatwave and the health risks that come with it. They're running campaigns to teach people how to stay cool, spot signs of heat-related illnesses, and get help if they need it. You can find these campaigns all over the place - on social media, at community centers, and in public service announcements (Huang et al., 2018).

□. Challenges and Effectiveness of Policy Implementation

While these strategies are well-meaning, there are a bunch of problems when it comes to putting them into action (Yang et al., 2023). But hey, some cities have actually done pretty well by getting things done effectively and involving the community.

1. **Funding Shortages:** One big issue is that there's just not enough cash to make these strategies happen, especially in smaller cities and less developed areas. Big projects like making urban areas greener and fixing up shantytowns need a lot of money, which isn't always easy to come by. This means that some places, like Beijing and Shanghai, are moving ahead faster because they've got more money than others (Gu & Tong, 2023).

2. **Poor Management and Coordination:** Making heatwave policies work requires different government departments and local authorities to work together smoothly. But sometimes bureaucracy gets in the way and things don't get coordinated properly. For example, there have been reports of delays in approving projects and mishandling funds in

some places, which has slowed down efforts to deal with heatwaves (Yang et al., 2023).

3. **Community Involvement and Local Successes:** Despite all these challenges, some cities have shown that getting the community involved can really make a difference. Like in Guangzhou where people have taken charge of making urban areas greener by planting trees and looking after green spaces themselves. When people get involved like this it not only makes projects more effective but also makes residents feel like they're part of something important (Yang et al., 2023).

4. **Monitoring and Evaluation:**We gotta keep checking in on these policies to see how they're doing and figure out where we can make them better. We should be collecting data on how the temperature is changing, how people's health is holding up, and whether folks are happy with what's going on. That way, we can tweak things that aren't working and expand the stuff that is. Some cities are even using fancy tech to track urban temperatures and see if our cooling efforts are actually doing the trick (Xie et al., 2015).

In conclusion, China has made some good progress in dealing with heatwaves by planting more trees in cities, improving housing conditions, and educating the public. But there are still problems like not enough money and inefficiency in managing these efforts. However, some cities have been successful in finding new ways to involve the community and come up with creative solutions. It's really important for Chinese cities to keep working on these challenges and expand on what's already working well to make sure they can handle heatwaves better (Gu & Tong, 2023).

Comparative Analysis and Evaluation of Policies: Differences in Strategy Selection and Policy Implementation

South Korea and China have distinct approaches to addressing the impacts of heatwaves, reflecting their different priorities and resources (You, Kim & Kim, 2019).

South Korea's Approach:

1. **Emergency Response:** South Korea focuses a lot on being ready for emergencies and taking quick action to protect people during heatwaves. They have a system that warns people about extreme heat and set up places where anyone can go to cool off when it gets too hot. The government makes sure these cooling centers are easy for everyone to get to and have everything they need when it's super hot outside (Kim, Park & Chae, 2020).

2. **Health Protection Measures:** South Korea puts a lot of effort into teaching people about how to stay healthy during hot weather and avoid getting sick from the heat. They spread this information through lots of different media so that as many people as possible know how to take care of themselves (Lee, Shin & Kim, 2016).

3. **Worker Protection Policies:** There are special rules in place to make sure that people who work outside don't get hurt by the heat. This includes giving them breaks at the hottest times of day without losing any pay so they can stay safe while they're working hard (Cho & Lee, 2018).

China's Approach:

1. **Long-term Infrastructure Improvement:** China is focusing on long-term strategies like making cities greener and upgrading housing in shantytowns. These steps are meant to really improve the urban environment and lessen the impact of heatwaves by reducing the urban heat island effect and making living conditions better (Gu & Tong, 2023).

2. **Environmental Management:** The country is putting money into creating more green spaces, like parks and rooftop gardens, to lower urban temperatures and provide shady spots. This is all part of a bigger plan to manage the environment that includes sustainable city development and initiatives to deal with climate change (You, Kim & Kim, 2019).

3. **Public Education and Awareness:** Just like South Korea, China also puts a lot of emphasis on public education, especially when it comes to getting people to make lasting changes in their behavior and get involved in their communities. They run different campaigns to encourage citizens to take part in things like planting trees and looking after green spaces so that everyone works together on dealing with climate change (Huang et al., 2018).

Empirical Evaluation of Social Impact

Empirical evidence from both countries indicates that their respective policies have had positive social impacts, although there are still areas in need of further improvement (Song, 2013; Yang et al., 2023).

South Korea:

1. **Positive Impacts:** So, they set up these cool public places and put in measures to protect people's health, which really helped cut down on heat-related illnesses. They also made sure there were emergency systems in place to warn people about the heatwaves and respond quickly (Kim, Park & Chae, 2020).

2. **Areas for Improvement:** But even with all that, they still need to do more for the most vulnerable folks like the homeless and low-income families. Some areas don't have enough of these cooling centers or they're hard to get to. And not all companies are following the rules to keep their workers safe.

China:

1. **Positive Impacts**: They've been investing in making cities greener and improving housing for a while now, and it's really helping bring down temperatures in urban areas and make life better in shantytowns. Plus, their education campaigns are getting more people involved in dealing with climate issues (Gu & Tong, 2023).

2.Areas for Improvement: But there are some problems with actually putting these plans into action because of money issues and slow bureaucracy. And they need to make sure everyone is doing this stuff across different regions too. It's important to keep an eye on how well these plans are working (Yang et al., 2023).

In conclusion, South Korea and China have different approaches to dealing with heatwaves. South Korea focuses on immediate relief and emergency response, while China emphasizes long-term infrastructure and environmental management. Both countries have made a positive impact on society, but there is still room for improvement in supporting vulnerable populations and ensuring consistent implementation of these policies across regions. It's important to keep monitoring, funding, and involving the community in order to build resilient cities that can withstand extreme heat events.

Challenges and Recommendations: Major Challenges in Current Policies

1.**Funding Limitations**:

South Korea: While South Korea has put in place a bunch of emergency measures for dealing with heatwaves, but the problem is that there's not enough money to keep up with building and maintaining cooling centers and other public facilities. This is especially tough in smaller towns and rural areas where there just isn't enough cash to really tackle the heatwave problem (Song, 2013).

China: Over in China, they need to invest a lot of money into making cities greener and improving housing. But because funds are limited, these projects can get delayed, especially in poorer regions. This means that some cities are moving ahead faster than others when it comes to dealing with heatwaves (Gu & Tong, 2023).

2.**Policy Consistency**:

South Korea:The thing is, worker protection policies aren't being enforced consistently across both public and private sectors. Public sector workers get breaks during the hottest parts of the day, but it's hit or miss for those working in private companies – which leaves a lot of people at risk for heat-related illnesses (Cho & Lee, 2018).

China: There's also a problem with government departments not working together smoothly and efficiently. This leads to delays and mishandling of funds when it comes to implementing heatwave policies on time (Yang et al., 2023).

3.**Meeting Specific Needs of Certain Groups**:

South Korea: Vulnerable populations, such as the elderly, low-income families, and the homeless, often do not receive adequate support during heatwaves. Not everyone can easily find a cool place to go or get the support they need in all areas. And not everyone knows how to stay safe during extreme heat (Kim, Park & Chae, 2020). It's tough for these groups to get what they need when it's super hot.

China: Even though China is working on making cities greener and improving housing for everyone, people living in shantytowns might still struggle during heatwaves. They might not have easy access to healthcare or places to cool down when it gets too hot (Yang et al., 2023). This makes things even riskier for them during extreme heat events.

Recommendations for Improvement

1. **Strengthening Community Participation**:

South Korea:It's important to get the community involved in planning and maintaining cooling centers and other heatwave response measures. Working with local organizations can help identify what residents need and make sure resources are used effectively (Kim, Park & Son, 2021). This collaboration will help meet the specific needs of the community members and make heatwave response measures more effective.

China:Involving residents in urban greening projects and local cooling solutions can give them a sense of ownership and responsibility. Letting communities take part in developing heatwave strategies can lead to better, customized responses (Yang et al., 2023).

2. **Improving Resource Allocation**:

South Korea: We need to put more money into heatwave response measures, especially in areas that don't have much

support. By investing more in cooling centers and public health campaigns, we can protect vulnerable populations better (Kim, Park & Chae, 2020).

China: Making sure funds for urban greening and housing improvement projects are distributed fairly across different regions can help address differences in policy implementation. Putting more money into less developed areas can make us better prepared for heatwaves (Gu & Tong, 2023).

3. **Enhancing Policy Flexibility**:

South Korea: Developing policies that can be adjusted to fit the specific needs of different regions and people can make heatwave responses more effective. This means creating public health campaigns that target vulnerable groups better and making sure that worker protection rules are enforced consistently in all industries (Cho & Lee, 2018).

China: Using management strategies that allow for real-time adjustments based on monitoring and evaluation data can improve the effectiveness of heatwave mitigation measures. Also, trying out new ideas and pilot projects can lead to better and more scalable solutions (Xie et al., 2015).

3. **Collaboration with NGOs and Community Residents**:

South Korea: Partnering with non-governmental organizations (NGOs) and community groups can really help reach more people with heatwave response measures. NGOs are important for finding vulnerable populations, educating the public, and providing emergency help (Lee, Shin & Kim, 2016). Their involvement is crucial for making heatwave responses work better.

China: Involving non-governmental organizations (NGOs) and local residents in planning urban greening and housing improvement projects can lead to more inclusive and effective strategies. Working together with local people makes sure that the community's specific needs are considered, leading to more sustainable outcomes (Yang et al., 2023).

By following these suggestions, both South Korea and China can improve their approaches to dealing with heatwaves, making sure that all residents - especially those who are most at risk - get better protection and support (Kim, Park & Son, 2021).

.Conclusion

Global climate change is making urban heatwaves happen more often and become stronger, which is really dangerous for people who are already struggling, especially those living in shantytowns. South Korea and China have different ways of dealing with this problem, but both have had some successes and failures (Song, 2013; Yang et al., 2023). These examples show how important it is to come up with good plans to help at-risk communities deal with the impact of urban heatwaves. It's crucial for leaders to think about what these communities need when they're making decisions about how to handle this growing threat. And we also need more research to understand why some places are more vulnerable or resilient than others.

South Korea's Approach

In South Korea, they've mostly focused on quick fixes and emergency plans for dealing with heatwaves. They set up systems that warn people when it's going to be really hot and opened public places where folks can go cool off during extreme heat. They also run campaigns to teach people how to stay safe in the heat and have rules in place to protect workers from getting sick because of the high temperatures (Kim, Park & Chae, 2020).

But even though they're trying hard, there are still problems with their plans. Not enough money and not always following through on protecting workers means that their efforts aren't as effective as they could be. And lots of vulnerable groups like old folks, low-income families, and homeless people don't get the help they need either - so there's a real need for better solutions that everyone can use (Cho & Lee, 2018).

China's Approach

China has this long-term plan to deal with heatwaves. They're all about fixing up the infrastructure and taking care of the environment. One thing they're doing is planting more trees and creating green spaces in cities to cool things down. And they're also trying to improve housing in shantytowns so people don't have to suffer through the heat indoors. Plus, they're running campaigns to get everyone involved in making their communities more resilient to climate change (Gu & Tong, 2023).

But here's the thing - it's not all smooth sailing. They're having trouble finding enough money for these projects, and there's a lot of red tape slowing things down. And because resources are spread out unevenly across different areas, some places are getting better help than others when it comes to dealing with heatwaves. On top of that, even though greening cities and fixing up housing helps most people, those living in shantytowns might still be left behind (Yang et al., 2023).

Future Directions

To effectively protect the health and well-being of vulnerable populations in the face of increasing heatwaves, future efforts must focus on several key areas:

1. **Closer Cooperation Between National and Local Levels**: National policies must be closely aligned with local implementation strategies to ensure effective allocation of resources and tailored measures that meet the specific needs of different regions and communities. It's important to coordinate better to fill in any gaps in policy coverage and make sure everyone is following the rules(Lee, Shin & Kim, 2016).
2. **Strengthening Community Participation**: Encouraging increased communities to be more involved in planning for and dealing with heatwaves. When local governments work closely with community organizations, they can figure out what residents really need. Letting communities help develop and put into action ways to deal with heatwaves can lead to responses that are more tailored and effective (Yang et al., 2023).
3. **International Collaboration**: 2. Dealing with climate change is a global challenge that needs countries working together. By sharing best practices, technologies, and funding ideas, we can all come up with better ways to deal with heatwaves. If we collaborate on research and innovation for climate resilience, we can find solutions that help all vulnerable populations (Huang et al., 2018).

By focusing on these areas, both South Korea and China can improve how they deal with heatwaves, making sure they better protect and support people who are most at risk. It's important to bring together national policies and local actions, get more involvement from the community, and work with other countries to make our cities stronger in the face of extreme heat (Kim, Park & Son, 2021).

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