During the early stages of an influenza pandemic, a pandemic vaccine likely will not be available. Therefore, interventions to mitigate pandemic influenza transmission in communities will be an important component of the response to a pandemic. Public-housing residents, single-parent families, and low-income populations may have difficulty complying with community-wide interventions.

To enable compliance with community interventions, stakeholders recommended the following: (1) community mobilization and partnerships, (2) culturally specific emergency communications planning, (3) culturally specific education and training programs, (4) evidence-based measurement and evaluation efforts, (5) strategic planning policies, (6) inclusion of community members as partners, and (7) policy and program changes to minimize morbidity and mortality. (Am J Public Health. 2009;99:S287–S293. doi:10.2105/AJPH.2009.165134)

LARGE CONCENTRATIONS OF

Public-housing residents, single-parent families, and poor families living in economically depressed neighborhoods continue to experience poor health status in the United States.1 Pre-existing social and health conditions will present major obstacles for stakeholders to effectively prepare for and respond to pandemic influenza in such communities.2

Few pandemic influenza plans, recommendations, and guidelines for preparedness and response have focused on the needs, barriers, concerns, and assets of public-housing residents, single-parent families, and poor populations.3–20 Data suggest that poverty, in addition to exposing individuals to more acute and chronic stressors, weakens an individual’s ability to cope with new problems and difficulties.21

In this article we (1) highlight public health challenges that might differentially affect public-housing residents, single-parent families, and low-income populations; (2) provide specific recommendations for protecting these population groups; and (3) determine measures that public health communities should take to support these populations for the cascading second- and third-order consequences of recommended interventions, such as isolation and treatment, voluntary home quarantine, social distancing, and antiviral medications and vaccines.

FIGURE 1—Overlapping populations of low-income households, single-parent families, and public-housing residents.
CONCEPTUAL FRAMEWORK

We developed a conceptual framework (Figure 2) to link the contributing and causal factors for preparing these selected populations in the event of an influenza pandemic. This framework was derived from a literature review of electronic databases and convening a meeting of stakeholders to obtain effective ways for stimulating community change.

FACTORS INFLUENCING VULNERABILITY TO PANDEMIC INFLUENZA

Pandemic influenza could cause high levels of illness, death, social disruption and economic loss. Death rates from pandemic influenza may be determined by the number of people who become infected, the virulence of the virus, the underlying characteristics and vulnerability of affected people, and the availability and effectiveness of preventive measures. Public-housing residents, single-parent families, and low-income populations are likely to be more susceptible to complications from pandemic influenza because of some combination of the following factors: (1) insufficient funds to stockpile medications and supplies, (2) lack of adequate insurance that delays receipt of effective health care, (3) inability to obtain high-quality health care with publicly funded health insurance, (4) unstable employment and inefficient job benefits along with weak social support networks, and (5) lack of awareness of effective personal health interventions or inability to apply them because of competing everyday survival needs.

These indicators of vulnerability are in turn influenced by underlying factors such as (1) poverty, (2) inequities in health status, (3) poor access and quality of care, (4) limited supply of pandemic vaccine, (5) low immunization rates, and (6) environmental factors. These social and personal factors are confounded by system, policy, and institutional factors that cannot be readily isolated or critically examined in a short essay focused on practical advice for lay persons.

Influence of Poverty on Pandemic Influenza

These populations are more susceptible to complications from pandemic influenza because of poverty. Women, especially single mothers, bear a disproportionate burden of poverty. Many low-income people are unable to meet their basic needs of adequate food, water, clothing, shelter, and health care. During an influenza pandemic, persons with low incomes may be reluctant to stay home from work because of fear of losing income, fear of being unemployed, and lack of flexibility in their jobs to work from home. These population groups may not receive compensated sick leave, may be employed in service-related industries in which telecommuting is not an option, or may work in industries with increased numbers of public contacts (e.g., fast-food service). These types of conditions may cause parents to keep their children in communal (unlicensed, unorganized, or informal) child care settings where risk exposures are relatively high.

Inequities in Health Status

High prevalence of and excess morbidity from diabetes; chronic diseases of the lung, heart, and kidneys; and acute respiratory infections, including influenza, are among the manifestations of poor health status in these vulnerable populations. Poverty and near poverty play an increasingly important role in determining health status.

Access and Quality of Care

The government’s response to Hurricane Katrina showed gaps in the nation’s ability to provide services for public-housing residents, single-parent families, and low-income populations. Public-housing residents are slightly more likely than other US citizens to be without health insurance or report financial barriers to medical care. According to the National Center for Health Statistics (NCHS), unmarried women aged 25–64 years are approximately 60% more likely than married women to lack health insurance coverage. Providing health care for the uninsured or underinsured during a pandemic may be a challenge for hospitals and physicians because more than 46 million persons living in the United States do not have health insurance and another 25 million are considered underinsured. In addition, low-income persons are more likely to
obtain regular medical care in emergency rooms, health departments, and community health centers. These locations are becoming increasingly crowded. Patients waiting for care in these settings are likely to have greater exposure to influenza viruses and other pathogens.31

**Limited Supply of Pandemic Vaccine**

In the event of a pandemic influenza outbreak, a pandemic vaccine may not be available or may be in limited supply because the antigenic details of the evolved pandemic strain of the virus may not be known before the outbreak occurs. This factor may lead to an inability to prepare large numbers of doses of highly effective vaccine preceding an influenza pandemic outbreak.40 Vaccines will likely be administered in accordance with a prioritization scheme by which groups to be vaccinated first are already identified, including health care workers; homeland security workers, police, firefighters and other first responders; government leaders; and specific population subgroups (i.e., pregnant women, infants, and toddlers).17

**Low Immunization Rates**

Influenza is responsible for more than 36,000 deaths per year. Some experts believe there will be a relationship between the low rates of seasonal influenza vaccination among low-income populations and the distribution and acceptance of an influenza pandemic vaccine among these groups.41 Evidence exists of effective measures that have been used to improve rates of seasonal influenza immunization among low-income groups, but there is much to be done to improve those rates.42

In 2003, the proportion of persons aged 18–64 years and aged 65 years and older who reported receiving influenza vaccinations during the preceding 12 months fell short of the 2010 Healthy People objectives of 60% and 90%,43 respectively. Characteristics associated with lower levels of vaccination coverage were race, age, and income below the federal poverty level. For persons aged 65 years and older, the vaccination rate for those below the poverty level among White, non-Hispanic, seniors was 59.5% ± 6.6, which was higher than that for Black, non-Hispanic, seniors (48.7% ± 9.7) and significantly higher than that for Hispanic seniors (38.5% ± 9.7).42

**ENVIRONMENTAL FACTORS INFLUENCING PANDEMIC INFLUENZA**

Public-housing residents are more likely than the community at large to be poor, and public housing is associated with poorer health. Substandard housing is a major public health issue associated with health conditions such as respiratory infections, asthma, lead poisoning, injuries, and mental health.44 Many residents of these populations face burdens of unsafe drinking water, absence of hot water for washing, ineffective waste disposal, housing infested by disease vectors (insects, mice, rats), inadequate food storage, overcrowding (from urbanization and landfill waste),30 and inadequate ventilation, which could cause serious implications during an influenza pandemic.44

The results of a metaregression performed using 4 nationally represented surveys determined that worsening housing instability and economic standing were associated with poorer health care access: being uninsured (5.4% per unit increase; 95% confidence interval [CI] = 1.7%, 9.2%; P = .011), postponing needed care (3.3%; 95% CI = 1.9%, 4.7%; P = .001), postponing medications (6.1%; 95% CI = 1.5%, 10.6%; P = .035), and having higher hospitalization rates, which is one measure of use of acute health care (2.9%; 95% CI = 1.2%, 4.6%; P = .008).45

**SOLUTIONS FOR PANDEMIC INFLUENZA PREPAREDNESS AND RESPONSE**

With limited vaccine and a tiered vaccine distribution plan, public health response activities for these targeted populations during a pandemic will rely on using nonpharmaceutical interventions and influenza antiviral medications, and these interventions will likely include both voluntary and imposed changes in social patterns. Community mitigation strategies include respiratory hygiene and cough etiquette, hand hygiene, isolation and treatment, voluntary home quarantine, school dismissal, and social distancing in the community and workplace.40 Both public health literature and stakeholders suggest that medical countermeasures and community mitigation strategies will be the most commonly used public health measures for protecting public-housing residents, single-parent families, and low-income populations in the event of an influenza pandemic.

**Mass Vaccination Programs**

Mass vaccination programs and vaccination intervention strategies mentioned in the literature may prove to be effective methods for improving vaccination rates among these populations in the event of an influenza pandemic. Federal, state, and local governments are proposing to use mass dispensing and vaccination clinics to swiftly distribute medication during an influenza pandemic. Many of the challenges of delivering medicines on a large scale during an emergency involve the receipt, breakdown, and distribution of the Strategic National Stockpile.46 Two key considerations in planning for mass vaccination clinics are (1) the capacity of each clinic, measured by the number of patients served per hour and (2) the time, measured in minutes, spent by patients in the clinic.47 Outreach and targeted communication efforts, as well as community partnerships, may be crucial in informing low-income communities about the location and distribution of pandemic vaccinations and medications.

Even though the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is not a mass vaccination program, strategies to promote immunization among clients in these programs have been effective in improving immunization coverage for low-income preschool children.48–50 Furthermore, WIC sites in the community could serve as mass vaccination clinics. WIC is the largest point of access to health-related services for low-income preschool children, a population known to have low immunization coverage.48

**Improving Vaccination Rates**

Several studies have identified interventions that were successful in improving vaccination rates among low-income populations. One study in east Harlem and the Bronx used intervention strategies that included disseminating
information through mailings, education, and targeted advertising; presenting at meetings; and providing street-based and door-to-door vaccination during influ-

enza vaccine seasons. Results from the study show that communities and groups were more interested in receiving the influenza vaccine after the interventions occurred (OR = 2.69; CI = 2.17, 3.33; P = < 0.01).51 Also, findings from the 2003 National Health Interview Survey indicated that among Hispanics, having Spanish-speaking health care providers and culturally specific, linguisti-
cally appropriate communication materials is associated with an increase in influenza vaccination coverage and a better response to communication materials about prevention messages and guidelines.42

Communicating Effectively With Targeted Populations

Prepandemic, pandemic, and postpandemic communications require special attention to ensure that public-housing residents, single-parent families, and low-income populations comply with community mitigation recommenda-
tions. Communicating effectively with the intended populations requires understanding the cultural context, social environment, and individual cognitions of these groups.52,53 Communication strategies should be designed to reflect the cultural backgrounds of these communities.57 Principles that can guide interactions and the development of messages for the targeted populations include the following: (1) build trust among individuals in the community, using gatekeepers, social networks, and lay communication leaders; (2) ensure that messages reach the intended recipient; (3) establish and deliver culturally competent and sensitive messages; (4) deliver personalized messages; and (5) use interpreters when needed.

Because there are cultural differ-
ences among these groups, it is imperative that the various styles of communication among these targeted populations are under-
stood. Social marketing and com-
munication theories that help to explain and prepare these commu-

nities for pandemic influenza are described by Vaughn and Tinker54 in another paper in this issue.

STAKEHOLDER STRATEGIES AND RECOMMENDATIONS

At a meeting held at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, during May 1–2, 2008, “Pandemic Influenza Preparedness and Response in Selected Vulnerable Populations,” 26 stakeholders were invited to promote community participation, support, and capacity building for organizing recommendations to protect certain populations—public-housing residents, single-parent families and low-income populations, their families, service providers, and other stakeholders—from the adverse health impact of an influenza pandemic. These external partners represented federal, state, and local departments of Housing and Urban Development; state and local agencies; community-based organizations; faith-based organizations; college officials and instructors; and community members that serve low-income populations.

Preparing the Community for Pandemic Influenza

Participants provided an overview of their community’s perceptions on health and crises situations; the importance of cultural values; patterns of using health services; and community mitigation risks. Even though the federal, state, and local govern-
ments have been engaged in ex-
tensive pandemic influenza pre-
paredness efforts, many of the meeting participants were un-
aware of a possible pandemic influenza outbreak. Participants were concerned about how knowledgeable and aware public-housing residents, single-parent fam-
ilies, and low-income populations were regarding a potential pan-
demic influenza and their involvement in preparedness activities. During the meeting, participants suggested that a com-
munity risk assessment be con-
ducted using participatory action research to (1) place community members in the lead role to conduct the assessment; (2) deter-
mine perceptions of needs, risks, and values in the communities; (3) determine strengths and weak-
nesses of the communities; and (4) obtain listings of resources in the community for developing effective strategies and recommendations for protecting these populations in the event of a pandemic influenza.

Participants concluded that communications and educational strategies are integral public health components for preparing these communities in the event of an influenza pandemic, ac-
knowledging the distinctions in lifestyles, beliefs, behaviors, and cultures of these groups. The design (including practical, scientific, and ethical issues), planning, implementation, and evaluation of educational and communication strategies should include community organizations, community participants, and gatekeepers in the community to provide individual and community change.

Recommendations for Pandemic Influenza Preparedness and Response

External partners considered the existing data on the impact of influenza, effectiveness of differ-
ent measures to lessen the burden of influenza, and barriers and strategies to implement measures to decrease the burden of influ-
enza among communities. The following recommendations were suggested to help public-housing residents, single-parent families, and low-income populations comply with community-mitigation measures in the prepandemic and pandemic stages of an influenza pandemic (Table 1).

Mobilization, partnerships, and networks. Establish community mobilization, partnerships, and networks with faith-based organi-
zations, community-based organi-
zations, neighborhood planning units, and key informants to help educate the community; provide mobile clinics, distribution centers, culturally and linguistically appropriate education information; and deliver food, medication, goods, and services.

Risk-communications plans. Estab-
lish a multifaceted, emergency risk-communications plan that is culturally specific and has relevant education messages.

Appropriate education and training programs. Offer culturally specific and linguistically appro-
riate education and training pro-
grams for adults and children on signs and symptoms of pandemic influenza; how to prepare for school closures, respond to public gatherings, and use good hygiene; and offer resources to help meet the needs of these target popula-
tions that use WIC and other programs.

Evidence-based measurement and evaluation system. Establish an evidence-based measurement and
### TABLE 1—Suggestions for Effective Pandemic Influenza Containment and Community Mitigation Strategies for Public-Housing Residents, Single-Parent Families, and Low-Income Populations

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Needs</th>
<th>Barriers</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>To prepare for recommendations about the use of vaccines</td>
<td>Community Mobilization</td>
<td>Lack of awareness, education, information</td>
<td>Engage and educate</td>
</tr>
<tr>
<td>(prepandemic, pandemic, and antivirals)</td>
<td>Culturally and linguistically appropriate education information</td>
<td>Limited supply of vaccine and antivirals</td>
<td>Develop culturally specific communication methods</td>
</tr>
<tr>
<td></td>
<td>Easy access to familiar and trusted distribution centers</td>
<td>Language barriers</td>
<td>Provide financial incentives</td>
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<tr>
<td></td>
<td>Enough vaccine for the community</td>
<td>Transportation and financial needs</td>
<td>Establish partnerships</td>
</tr>
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<td></td>
<td>Community involvement in an effective distribution plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To prepare and respond to recommendations about hygiene</td>
<td>Personal items necessary for staying at home</td>
<td>Not engaging stakeholders early</td>
<td>Culturally competent communication methods</td>
</tr>
<tr>
<td></td>
<td>Resources and manpower to provide education about pandemic influenza</td>
<td>Lack of knowledge or understanding issues</td>
<td>Engage faith-based organizations, CBOs, and neighborhood planning units</td>
</tr>
<tr>
<td></td>
<td>Effective communication methods</td>
<td>Limited resources</td>
<td>Identify community liaisons</td>
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<tr>
<td></td>
<td>Early engagement of the community</td>
<td>Mixed or competing messages</td>
<td></td>
</tr>
<tr>
<td>To prepare and respond to recommendations about school closures</td>
<td>Clear policy on school closures</td>
<td>No alternatives for child care</td>
<td>Defined school policies</td>
</tr>
<tr>
<td></td>
<td>Health education and event preparedness</td>
<td>Increased financial burden</td>
<td>Voucher, waived fees for child care</td>
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<tr>
<td></td>
<td>Trained staff</td>
<td>Lack of information</td>
<td>Community engagement</td>
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<tr>
<td></td>
<td>Alternate daycare and after-school care solutions</td>
<td>Reluctance to accept services</td>
<td>Stockpile necessities using food banks, churches, community resources</td>
</tr>
<tr>
<td>To prepare and respond to recommendations about workplace policy during an influenza pandemic</td>
<td>Workplace pandemic plan</td>
<td>Lack of social support</td>
<td>Social and psychological support systems</td>
</tr>
<tr>
<td></td>
<td>Means to offset personnel loss and absences</td>
<td>Fear of loss of jobs or profits</td>
<td>State and Federal mandates for assistance</td>
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<tr>
<td></td>
<td>Employer and employee educational support</td>
<td>Unclear expectations</td>
<td>Alternative compensation packages</td>
</tr>
<tr>
<td></td>
<td>Federal legislation on workplace closure and policies</td>
<td>Lack of adequate communications</td>
<td>Government freeze on prices, wages, and so on</td>
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<td></td>
<td>Education for employers and employees</td>
<td>Political influence</td>
<td>Flexibility (work from home)</td>
</tr>
<tr>
<td>To prepare and respond to recommendations about avoiding public gatherings</td>
<td>Social interaction</td>
<td>Resistance to policies for fear of job loss</td>
<td>Community involvement in workplace plan</td>
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<tr>
<td></td>
<td>Purchase of goods and services</td>
<td>Difficulty enforcing isolation</td>
<td>Education and training</td>
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<tr>
<td></td>
<td>Policies that are evidence based and explanatory</td>
<td>Varying definitions of public gatherings</td>
<td>Home-structured activities and programs</td>
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<tr>
<td></td>
<td>Education regarding the definition of public gatherings and need for postponement or cancellation of events</td>
<td>Economic challenges</td>
<td>Delivery of goods and services</td>
</tr>
<tr>
<td></td>
<td>Stay-at-home alternatives</td>
<td>Inability to communicate with others</td>
<td>Culturally competent messages</td>
</tr>
<tr>
<td>To prepare and respond to recommendations about pandemic status, affected communities, risk, and recommended action</td>
<td>Right message, right time, right people</td>
<td>Inability to acquire personal needs</td>
<td>Mobile clinics and distribution centers</td>
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<td></td>
<td>Action-based planning</td>
<td>Misinformation</td>
<td>Keep it simple</td>
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<tr>
<td></td>
<td>Education and buy-in</td>
<td>Apathy toward messages</td>
<td>Culturally sensitive and specific communications</td>
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<td></td>
<td>Honesty and transparency</td>
<td>Messages not targeting the audience</td>
<td>Action-based educational messages</td>
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<td></td>
<td></td>
<td>Messenger should know community</td>
<td>Use of existing mechanisms</td>
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<tr>
<td></td>
<td></td>
<td>Messages too wordy</td>
<td></td>
</tr>
<tr>
<td>To identify signs and symptoms of pandemic influenza</td>
<td>Resources</td>
<td>Lack of community coordination</td>
<td>Education and training</td>
</tr>
<tr>
<td></td>
<td>Knowledge, training, education</td>
<td>Limited resources</td>
<td>Checklist for home</td>
</tr>
<tr>
<td></td>
<td>Simplistic, culturally relevant messages</td>
<td>Lack of realistic expectations for identification and prevention</td>
<td>Available personal protective equipment</td>
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<td></td>
<td>Community involvement</td>
<td>Spiritual/religious restrictions/beliefs</td>
<td>Hotline case management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lack of trust and fear of being ostracized</td>
<td>Community resources</td>
</tr>
</tbody>
</table>


**Evaluation system guided by federal, state, and local governments to assess the progress, level of preparedness, and effectiveness of intervention strategies targeting low-income populations.**

**Planning policies.** Establish strategic planning policies, in partnership with faith-based organizations, community-based organizations, neighborhood planning units, and other partners for social distancing, containment, and the distribution of antiviral medications and vaccine.
Community partners. Ensure community members are partners—sooner rather than later—in the strategic planning process.

Advocacy. Advocate for policy and program changes at the federal, state, and local levels to minimize morbidity and mortality among low-income populations, such as policies for school closures, compensation packages, and state/federal mandates for assistance.

Stakeholder Suggestions

Stakeholders also suggested the following actions for public health practitioners, health care providers, and emergency managers to enhance the community’s compliance with mitigation interventions:

• Use mobile units to deliver health care services;
• Provide transportation to health care facilities;
• Distribute and ensure access to vaccine and antiviral medications;
• Provide culturally and linguistically appropriate educational information, materials, and messages about pandemic influenza; and
• Provide trained staff to handle inquiries and problems about school closings, workplace policies, public gatherings, alternatives for childcare, social support, and distribution plans for vaccine, antiviral, food, and other supplies.

These suggestions will enable governments, organizations, and associations to reach public-housing residents, single-parent families, and low-income populations with the appropriate information, adequate training, and awareness of disaster preparedness. Governments and community groups will benefit from sharing ideas on how best to collaborate to reach these groups and build trust among their communities.54 In addition, research is needed to prevent or minimize racial and ethnic disparities in vaccine distribution and acceptance, respond to mitigation strategies, and address factors that influence influenza-related diseases.2

CONCLUSIONS

Public health strategies for mitigating pandemic influenza among public-housing residents, single-parent families, and low-income populations are crucial for protecting these populations. Early diagnosis and timing of community mitigation strategies during a pandemic is critical for public safety, health, and treatment. Low-income populations often delay treatment and care because of issues with access and financial constraints, and being poor is one of the characteristics that has often been associated with lower influenza vaccination coverage. Planning and coordination efforts during an influenza pandemic require collaboration at all levels (federal, state, and local governments) and involves cooperation of leaders from the public and private sectors. National and homeland security, health care providers, community support groups, and planners of critical infrastructure should include the needs of vulnerable populations in planning activities for the potential worldwide threat of an influenza pandemic. Because of the uncertainty of the capacity of the federal, state, and local governments, there may be challenges in moving these recommendations forward to uncertain actions.

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Note. The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the CDC. Moreover, this article includes statements made by individuals convened by the CDC for the purpose of obtaining their input. Such statements also do not necessarily represent the views of the CDC.

Contributors

K. Bouye was responsible for formulating the paper, conducting the literature review, writing and revising each draft document, and reconciling contributions to the final draft from co-authors and reviewers. B. I. Truman helped conceptualize and organize the article, reviewed the drafts, and provided important insights. S. Hutchins and C. Brown contributed to the literature review, read the drafts, and provided important insight. R. Richard contributed to the literature review and provided important insight. J. A. Galllory and J. Rashid read the drafts and provided important insights.

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