The Ties that Bind: Redefining MCH in the Age of Chronic Disease Management, Social Determinants of Health, and Interconceptional Care

CAPT Wanda D. Barfield, MD, MPH, FAAP
Director
January 28, 2011
Outline

• Mission, Structure, and New Vision of DRH
• Integration of Chronic Disease with MCH
• Chronic Disease Prevention; the Role of Reproductive Health
• Winning Battles, Transforming Communities, Improving Systems
• Implications for Practice
MCH and Chronic Disease: The Game of Double Dutch

When do you jump in?
Mission:

To promote optimal reproductive and infant health and quality of life by influencing public policy, health care practice, community practices, and individual behaviors through scientific and programmatic expertise, leadership and support.
Promote Healthy Reproduction for a Healthy Future
CDC’s Safe Motherhood and Infant Health Initiative: Priority Areas

**Infant Health:**
Promoting the health and well-being of infants

**Maternal Health:**
Advancing the health of mothers

**Women’s Reproductive Health:**
Improving health through research

**Unintended and Teen Pregnancy Prevention:**
Preventing teen and unintended pregnancies

**Global Reproductive Health:**
Committed to a healthier world
Infant Health

Preterm Birth

• Surveillance, research, and programs
• Translation of new research discoveries into public health prevention strategies
• Supporting community-based prevention programs among minority women

Sudden Unexpected Infant Death

• National initiative to improve the accuracy/consistency of reporting and classifying SUID deaths.
Maternal Health

PRAMS
• Ongoing, population-based, state-based surveillance system of women delivering live infants

Maternal and Child Health Epidemiology Program
• Builds state capacity to use and apply sound epidemiologic-scientific information to maternal and child health programs and policies.

Emergency Preparedness and Response
• Comprehensive preparedness plan focused on reproductive and perinatal health
Women’s Reproductive Health

Chronic Disease Integration

• Monitoring chronic disease and chronic disease risk factors among women of reproductive age
  • Smoking
  • Hypertension
  • Diabetes

Assisted Reproductive Technology Surveillance

• Annual ART success rates report
• Data linkage to assess birth outcomes
Teen and Unintended Pregnancy Prevention

Teen Pregnancy Prevention
• Cooperative agreements to increase capacity of local organizations

Contraceptive Safety, Effectiveness and Use
• U.S.-specific adaptation of Medical Eligibility Criteria for Contraceptive Use

Interventions to Prevent HIV, STD, and Unintended Pregnancy
• Research assessing efficacy of biomedical and behavioral interventions
Global Reproductive Health

Maternal/Perinatal Mortality Prevention

• Sub-Saharan Africa
• Latin America
• Afghanistan

Technical Assistance

• Assessing the reproductive health needs of conflict-affected and refugee populations
• Collaboration with global partners
Beginning with the end in mind

Optimal maternal health for optimal infant and child health
Disparities in Chronic Disease and the Risk to the Fetus

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Children Overall</th>
<th></th>
<th>Non-poor Children</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prevalence (%)</td>
<td>95 % CI</td>
<td></td>
<td>95 % CI</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>8.2</td>
<td>(7.6--8.9)</td>
<td>7.6</td>
<td>(7.0--8.3)</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>14.6</td>
<td>(13.4--15.9)</td>
<td>13.6</td>
<td>(11.8--15.7)</td>
</tr>
<tr>
<td>Multiracial</td>
<td>13.6</td>
<td>(11.1--16.6)</td>
<td>9.2</td>
<td>(6.4--13.2)</td>
</tr>
<tr>
<td>Hispanic, Puerto Rican descent**</td>
<td>18.4</td>
<td>(14.9--22.5)</td>
<td>14.0</td>
<td>(10.0--19.3)</td>
</tr>
</tbody>
</table>

Source: National Health Interview Survey; Children aged 0-17 years
Prevalence of Obesity among Females by Age Group and Race/Ethnicity in US over time

# Age-Adjusted Prevalence of Medically Diagnosed Diabetes among Female Adults by Selected Characteristics, U.S., 2004 and 2008

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>2004</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prevalence (%)</td>
<td>95 % CI</td>
</tr>
<tr>
<td>Female, White, non-Hispanic</td>
<td>5.4</td>
<td>(4.8--6.0)</td>
</tr>
<tr>
<td>Female, Black, non-Hispanic</td>
<td>10.7</td>
<td>(9.1--12.3)</td>
</tr>
<tr>
<td>Female, Asian</td>
<td>8.6</td>
<td>(2.1--15.1)</td>
</tr>
<tr>
<td>Female, Hispanic</td>
<td>10.5</td>
<td>(8.9--12.1)</td>
</tr>
</tbody>
</table>

Source: National Health Interview Survey; Adults aged 18+ years
### Number and Rate* of Deaths due to Coronary Heart Disease and Stroke, U.S. 2006

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Heart Disease N</th>
<th>Heart Disease rate</th>
<th>Stroke N</th>
<th>Stroke rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaska Native</td>
<td>1,880</td>
<td>97.4</td>
<td>548</td>
<td>29.4</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7,570</td>
<td>77.1</td>
<td>3,662</td>
<td>37.0</td>
</tr>
<tr>
<td>Black</td>
<td>44,530</td>
<td>161.6</td>
<td>17,045</td>
<td>61.6</td>
</tr>
<tr>
<td>White</td>
<td>371,445</td>
<td>134.2</td>
<td>115,864</td>
<td>41.7</td>
</tr>
<tr>
<td>Hispanic</td>
<td>20,939</td>
<td>106.4</td>
<td>7,005</td>
<td>34.2</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>403,588</td>
<td>136.8</td>
<td>129,892</td>
<td>44.0</td>
</tr>
</tbody>
</table>

*Source: National Center for Health Statistics, CDC*
Impact of Maternal Health Disparities on Fetal and Infant Health Disparities

- Stillbirths
- Infant Death
- Birth Defects
- Growth Restriction
- Preterm Birth
Stillbirths, U.S.
Whites vs Blacks, 2003-05

The graph shows the rate of stillbirths per 1,000 births by gestational age, comparing Whites and Blacks from 2003 to 2005. The rate decreases significantly before rising sharply in the latter weeks of pregnancy.
# U.S. Infant Mortality, 2006

<table>
<thead>
<tr>
<th>Maternal race/ethnicity</th>
<th>Infant mortality rate</th>
<th>Difference compared with non-Hispanic white mothers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaska Native†</td>
<td>8.28</td>
<td>48.4§</td>
</tr>
<tr>
<td>Asian/Pacific Islander†</td>
<td>4.55</td>
<td>−18.5§</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>13.35</td>
<td>139.2§</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>5.58</td>
<td>Ref.</td>
</tr>
<tr>
<td>Hispanic, total¶</td>
<td>5.41</td>
<td>−3.0</td>
</tr>
<tr>
<td>Central or South American</td>
<td>4.52</td>
<td>−19.0§</td>
</tr>
<tr>
<td>Cuban</td>
<td>5.08</td>
<td>−9.0</td>
</tr>
<tr>
<td>Mexican</td>
<td>5.34</td>
<td>−4.3§</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>8.01</td>
<td>43.5§</td>
</tr>
<tr>
<td>Total</td>
<td>6.68</td>
<td>—</td>
</tr>
</tbody>
</table>

*Source: National Center for Health Statistics, CDC*
Live Births by Gestational Age
U.S. Whites vs Blacks, 2003-05
Maternal Chronic Disease Results in Preterm Birth

Examples:

- Chronic hypertension
- Systemic lupus erythematosus
- Lung disease
- Hyperthyroidism
- Pregestational diabetes mellitus
- Cardiac disease
- Asthma
- Gestational diabetes mellitus
- Pregestational renal disorders
- Hypertensive disorders of pregnancy
Consequences of Preterm Birth

Lung problems
- Broncho-pulmonary dysplasia
- Reactive airways disease/asthma

Cardiovascular problems
- SIDS
- Cardiac disorders

Renal problems
- Hypertension

Developmental problems
- Intraventricular hemorrhage
- Cerebral palsy
- Mental Retardation

Metabolic problems
National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP)

Office of the Director
Ursula E Bauer, Ph.D., M.P.H.

- Division of Adult and Community Health
- Division of Adolescent and School Health
- Division of Cancer Prevention and Control
- Division of Diabetes Translation
- Division of Hearth Disease and Stroke Prevention
- Division of Nutrition, Physical Activity, and Obesity
- Division of Oral Health
- Division of Reproductive Health
- Office on Smoking and Health
NCCDPHP Action Areas

Public Health Infrastructure
- Surveillance
- Applied research
- Capacity building /workforce

Healthy Communities
- Tobacco control
- Nutrition and physical activity
- Child and adolescent health
- Oral health
- Sexual health

Healthy Care Environments
- Promote delivery of clinical preventive services
- Chronic disease management
- Healthy schools and work environments
CDC Working With Communities

- REACH
- ACHIEVE
- Strategic Alliance for Health
- Prevention Research Centers
- Communities Putting Prevention to Work
- Community Transformation Grants
CDC’s Key Winnable Battles

- Healthcare-Associated Infections
- HIV
- Motor Vehicle Injuries
- Nutrition, Physical Activity, Obesity & Food Safety
- Teen Pregnancy
- Tobacco
Dr. Frieden’s Public Health Pyramid

- Counseling and Education
- Clinical Interventions
- Long-Term Interventions
- Policy
- Socio-economic factors
Teen Pregnancy as a Winnable Battle

www.cdc.gov/teenpregnancy
Birth Trends by Race/Ethnicity, Girls 15-19

Source: National Center for Health Statistics
CDC’s Approach to Teen Pregnancy Prevention

- Reducing the cycle of poverty and academic/career achievement
- Eliminating age limits for confidential services
- Long acting reversible contraceptives
- Oral contraceptives
- Education
CDC is Working in Communities with High Teen Birth Rates

• Enhancing community partnerships & Improving access to family planning

• Promoting evidence-based prevention programs and policies

• Working with diverse communities—especially African American and Latina youth

Grantees are funded, in part, through a collaboration with the HHS Office of Adolescent Health, President’s Teen Pregnancy Prevention Initiative and the Office of Population Affairs, Title X Program.
Jumping in: An example
Perinatal Regionalization and Levels of Neonatal Care

### Background

- Emerged in the late 1960s, first published guidelines in 1976.
- System of organizing perinatal care within geographical regions.

### Levels of Neonatal Care

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>Basic, uncomplicated neonatal care</td>
</tr>
<tr>
<td>Level II</td>
<td>Care for moderately-ill neonates expected to resolve quickly</td>
</tr>
<tr>
<td>Level III</td>
<td>Equipped to handle serious neonatal illnesses and abnormalities, including very low birth weight infants (VLBW) (&lt;1500g)</td>
</tr>
</tbody>
</table>
U.S. Trends in Neonatal Mortality: Advances in Intensive Care

Pre-perinatal regionalization era

*NMR=neonatal mortality rate: # deaths to infants <28 days/1,000 live births
Current Problems/Challenges

Disintegrating Systems of Regionalization
• Poor/uninsured most vulnerable
  • Potential increase risk for VLBW or critically ill newborns

Stagnant/Increasing Infant Mortality
• Approx 55,000 VLBW births/year
  • 2% of US births
  • 50% of US infant deaths
  • Survivors: major contributor to long-term morbidity

Ineffective Guidelines
• Essentially unchanged from previous versions for level III
• Slow adoption by stakeholders
• Inconsistent classification/definitions
Questions

Evidence
• How important is the level of hospital at birth to VLBW survival?

Policy
• What are the existing state policies on neonatal levels of care? Are they effective?

Data to action
• How can the existing data inform policy and improve practice?
Evidence: Level of Care and VLBW Outcomes

Meta-analysis of published literature over 30 years

Methods:

• Cochrane Database guidelines for literature search
  • a-priori inclusion/exclusion criteria
  • Systematic data coding and abstraction of each publication with independent reviewers using standardized forms
    • ORs 95% CIs
    • Rates, %s, counts
  • Additional subgroup analysis characteristics
    • Study design, location, population-based data, control of confounding, outcome, data source, birth weight subgroups, hospital level of comparison

Lasswell, Barfield, Rochat, Blackmon: JAMA 2010
Evidence

- 41 studies published between 1978 and 2008
- Combined study population of 113,144 VLBW infants.

- No Evidence of Publication Bias

Funnel Plot:

Egger’s Test of the Intercept: Insignificant (p=0.825)

- One-Study-Removed Sensitivity Analysis: Clear
Mortality at Non-Level II Hospitals

Overall Weighted, Combined Odds Ratio
- VLBW (≤1500g) infants (37 studies)
  - OR 1.62, 95% CI 1.44-1.83

Comparison Subsets
- ELBW (≤1000g) infants (4 studies)
  - OR 1.64, 95% CI 1.14-2.36
- Very Preterm (≤32 weeks) infants (4 studies)
  - OR 1.55, 95% CI 1.21, 1.98
Change in Evidence Over Time

Meta-Regression of log odds ratio by year of publication did not show a change in effect over time (slope 0.000, p value= 0.87).

Regression of Year on Log odds ratio

Lasswell, Barfield, Rochat, Blackmon: In Preparation
Policy: State Roles in the Provision of Neonatal Services

States regulate health care services and facilities
- License hospitals
- Promulgate State Health Plans/Regulations
- Approve facility expansion and construction
- Implement Title V programs ($)

Studies: all 50 states and DC
- Definitions
- Performance measures/outcomes

*Blackmon, Barfield, Stark J Perinatol 2009
<table>
<thead>
<tr>
<th>None</th>
<th>Named Beds/Units</th>
<th>Two Levels</th>
<th>Three Levels</th>
<th>Four Levels</th>
<th>Five or More Levels</th>
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<tbody>
<tr>
<td>Arkansas</td>
<td>Alaska</td>
<td>Oklahoma</td>
<td>California</td>
<td>Alabama</td>
<td>Arizona</td>
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<td>Connecticut</td>
<td>Rhode Island</td>
<td>Hawaii</td>
<td>Florida</td>
<td>Colorado</td>
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<tr>
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<td>District of</td>
<td>Wisconsin</td>
<td>Kansas</td>
<td>Georgia</td>
<td>Delaware</td>
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<td></td>
<td>Columbia</td>
<td></td>
<td>Kentucky</td>
<td>Louisiana</td>
<td>Illinois</td>
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<td></td>
<td>Idaho</td>
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<td>Maine</td>
<td>Massachusetts</td>
<td>Indiana</td>
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<td></td>
<td>Michigan</td>
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<td>Mississippi</td>
<td>New Jersey</td>
<td>Iowa</td>
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<td></td>
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<td>Nevada</td>
<td>New York</td>
<td>Maryland</td>
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<td>Ohio</td>
<td>North Carolina</td>
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<td>Montana</td>
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<td>Pennsylvania</td>
<td>Tennessee</td>
<td>Washington</td>
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<td>Virginia</td>
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<td>Utah</td>
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<td></td>
<td>Oregon</td>
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<tr>
<td></td>
<td>Vermont</td>
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<td></td>
<td>West Virginia</td>
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<tr>
<td></td>
<td>Wyoming</td>
<td></td>
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</tr>
</tbody>
</table>

*Blackmon, Barfield, Stark J Perinatol 2009*
HRSA/MCHB Performance Measure #17: Percent of VLBW Infants Delivered at Facilities for High Risk Deliveries and Neonates by State

*Goal: 90%*
Data to Action

- Expanded birth certificate, 2003 version
- Data on NICU admission at birth
- Included 16 states in 2006
- Drawn from documentation from the medical record
  - NCHS definition:
    - NICU defined as “Hospital facility or unit staffed and equipped to provide continuous mechanical ventilatory support for a newborn for more than 24 hours.”
  - = AAP Level 3A definition
# NICU Admission at Birth by Race: VLBW Infants, 2006

## Table 1.

<table>
<thead>
<tr>
<th>State</th>
<th>No. of infants with VLBW</th>
<th>Total*</th>
<th>White, non-Hispanic</th>
<th>Black, non-Hispanic</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>95% CI†</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Overall§</td>
<td>25,231</td>
<td>19,512</td>
<td>77.3 (76.8–77.9)</td>
<td>8,579</td>
<td>80.5 (79.7–81.3)</td>
</tr>
<tr>
<td>California</td>
<td>5,965</td>
<td>3,801</td>
<td>63.7 (62.5–64.9)</td>
<td>1,036</td>
<td>68.1 (65.8–70.4)</td>
</tr>
<tr>
<td>Delaware</td>
<td>193</td>
<td>172</td>
<td>89.0 (84.5–93.4)</td>
<td>74</td>
<td>91.4 (85.3–97.5)</td>
</tr>
<tr>
<td>Florida</td>
<td>3,306</td>
<td>2,718</td>
<td>82.2 (80.9–83.5)</td>
<td>943</td>
<td>82.1 (79.9–84.3)</td>
</tr>
<tr>
<td>Idaho</td>
<td>206</td>
<td>176</td>
<td>85.4 (80.5–90.2)</td>
<td>138</td>
<td>85.7 (80.3–91.1)</td>
</tr>
<tr>
<td>Kansas</td>
<td>411</td>
<td>331</td>
<td>80.7 (76.9–84.5)</td>
<td>227</td>
<td>84.4 (80.1–88.7)</td>
</tr>
<tr>
<td>Kentucky</td>
<td>647</td>
<td>573</td>
<td>88.6 (86.1–91.0)</td>
<td>423</td>
<td>87.8 (84.9–90.7)</td>
</tr>
<tr>
<td>North Dakota</td>
<td>82</td>
<td>77</td>
<td>93.4 (87.8–99.0)</td>
<td>67</td>
<td>93.1 (87.2–99.0)</td>
</tr>
<tr>
<td>Nebraska</td>
<td>276</td>
<td>232</td>
<td>84.3 (79.9–88.6)</td>
<td>172</td>
<td>86.9 (82.2–91.6)</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>121</td>
<td>102</td>
<td>84.3 (77.8–90.8)</td>
<td>90</td>
<td>84.1 (77.2–91.0)</td>
</tr>
<tr>
<td>New York**</td>
<td>1,588</td>
<td>1,401</td>
<td>88.2 (86.6–89.8)</td>
<td>840</td>
<td>88.1 (86.0–90.2)</td>
</tr>
<tr>
<td>Ohio</td>
<td>1,991</td>
<td>1,534</td>
<td>77.0 (75.2–78.9)</td>
<td>990</td>
<td>79.1 (76.8–81.4)</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1,998</td>
<td>1,667</td>
<td>83.4 (81.8–85.0)</td>
<td>985</td>
<td>86.0 (84.0–88.0)</td>
</tr>
<tr>
<td>South Carolina</td>
<td>944</td>
<td>815</td>
<td>86.4 (84.2–88.6)</td>
<td>304</td>
<td>86.9 (83.4–90.4)</td>
</tr>
<tr>
<td>South Dakota</td>
<td>111</td>
<td>104</td>
<td>92.8 (87.2–98.3)</td>
<td>65</td>
<td>91.6 (85.1–98.1)</td>
</tr>
<tr>
<td>Tennessee</td>
<td>1,316</td>
<td>1,132</td>
<td>86.0 (84.1–87.9)</td>
<td>633</td>
<td>86.8 (84.3–89.3)</td>
</tr>
<tr>
<td>Texas</td>
<td>5,266</td>
<td>4,107</td>
<td>78.1 (76.9–79.2)</td>
<td>1,246</td>
<td>76.1 (74.0–78.2)</td>
</tr>
<tr>
<td>Vermont</td>
<td>57</td>
<td>45</td>
<td>79.0 (68.4–89.5)</td>
<td>44</td>
<td>80.0 (69.4–90.6)</td>
</tr>
<tr>
<td>Washington</td>
<td>726</td>
<td>518</td>
<td>71.5 (68.2–74.8)</td>
<td>299</td>
<td>73.5 (69.2–77.8)</td>
</tr>
</tbody>
</table>

* Includes 1,252 births to Asian/Pacific Islander and American Indian/Alaska Native women and 252 births to women with unspecified race/ethnicity.
† Confidence interval.
§ Because of small numbers, stratified analysis by state and maternal race/ethnicity is not reported. State-specific analyses are provided in this report.
¶ Data excluded because cell size <30.
** Excludes New York City.
• Evidence: Place matters for VLBW infant survival and the elimination of disparities

• Policy: States vary considerably in definitions, criteria, and monitoring

• Action: Collaborative partnerships need to be developed to adopt standardized measures to save lives
Partnerships to Improve Risk-Appropriate Care

CDC/HRSA/AMCHP/AAP/ACOG/MOD
• Multi-state collaboration to improve PM-17 data
• CA, AK, TN, NY, FL, CO

TIOP-III
• Quality improvement in perinatal care

Joint Commission

ACOG
• Antenatal transfer
• Maternal levels of care?
MCH in the Age of Chronic Disease:
How will you jump in to the challenge?
Questions?

Wanda D. Barfield, M.D., M.P.H.
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Director, Division of Reproductive Health
National Center for Chronic Disease Prevention
and Health Promotion
Centers for Disease Control and Prevention
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wbarfield@cdc.gov

http://www.cdc.gov/reproductivehealth/