Infant and young child feeding practices among children 0-23 months presenting to Nonga General Hospital

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Malnutrition is one of the leading causes of morbidity and mortality among children <5 years old [2,3]

Undernourished children are at a higher risk of dying from common childhood illnesses such as diarrhoea, pneumonia and malaria [1,2]

Proper feeding of infants and young children increases chances of survival and promotes optimal growth and development in children <5 years old [1,2,4]

The National Infant and Young Child Feeding Policy 2014 Section 3.3.16: “Qualitative and quantitative research on infant and young child feeding practices will be encouraged at all levels of service delivery and community.”
MALNUTRITION STATISTICS

- 5.9 million deaths of children under 5 years of age in 2015. 45% of these deaths associated with malnutrition
  

- 44% of Papua New Guinean children physically stunted, 5% wasted, 18% underweight
  
  Papua New Guinea National Nutrition Survey.2005

- 14% of all admissions associated with severe acute malnutrition, 18.85% case fatality rate for severe acute malnutrition
  

- 14% of admissions associated with severe acute malnutrition, 17.9% case fatality rate with severe acute malnutrition
  
  Paediatric Hospital Reporting – Nonga General Hospital. 2015
WHAT IS THE MOST IMPORTANT INTERVENTION TO PREVENT UNDER 5 DEATHS?

a) Insecticide treated materials
b) Hib (meningitis) vaccine
c) Breast feeding and complementary feeding
d) Vitamin A and zinc supplements
**ANSWER:**

19% of deaths of children under 5 years old prevented by optimal infant and young child feeding

<table>
<thead>
<tr>
<th>PREVENTATIVE INTERVENTIONS</th>
<th>PROPORTION OF UNDER 5 DEATHS PREVENTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exclusive and continued breastfeeding until 1 year of age</td>
<td>13%</td>
</tr>
<tr>
<td>2 Insecticide treated materials</td>
<td>7%</td>
</tr>
<tr>
<td>3 Appropriate complementary feeding</td>
<td>6%</td>
</tr>
<tr>
<td>4 Zinc</td>
<td>5%</td>
</tr>
<tr>
<td>5 Clean delivery</td>
<td>4%</td>
</tr>
<tr>
<td>6 Hib vaccine</td>
<td>4%</td>
</tr>
<tr>
<td>7 Water, sanitation, hygiene</td>
<td>3%</td>
</tr>
<tr>
<td>8 Antenatal steroids</td>
<td>3%</td>
</tr>
<tr>
<td>9 Newborn temperature management</td>
<td>2%</td>
</tr>
<tr>
<td>10 Vitamin A</td>
<td>2%</td>
</tr>
</tbody>
</table>

**REFERENCE:**

THE GLOBAL STRATEGY FOR INFANT AND YOUNG CHILD FEEDING

- Developed by WHO and UNICEF in 2002
- Re-focus world attention on the impact of feeding practices on the nutritional status and general health of infants and young children

- 3 major areas:
  i. Exclusive breastfeeding 0-6 months
  ii. Timely and appropriate complementary feeding
  iii. Feeding in exceptionally difficult circumstances
There is no significant difference in the feeding practices of caregivers who were exposed to infant and young child feeding advice from a health worker in the past 24 months and the feeding practices of those of caregivers who were not.
**AIM:** To determine prevalence of infant and young child feeding practices in the sample population and the association between these and caregiver exposure to infant and young child feeding advice

**OBJECTIVES:**

1. Determine prevalence of breast feeding and complementary feeding practices as defined by the World Health Organisation
2. Assess caregiver exposure to feeding advice from a health worker in the past 24 months
3. Determine the relationship between caregiver exposure to nutrition education and optimal infant and young child feeding practices
4. Identify any other factors favourably associated with optimal breastfeeding and complementary feeding
<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>DESCRIPTION</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STUDY TYPE</strong></td>
<td>Cross sectional</td>
<td>Focus on point prevalence of under-nutrition and infant and young child feeding practices. No follow ups or reviews.</td>
</tr>
<tr>
<td><strong>STUDY DESIGN</strong></td>
<td>Prospective descriptive study</td>
<td>Parameters of comparison: Optimal infant and young child feeding practices and caregiver exposure to feeding advice</td>
</tr>
<tr>
<td><strong>SITE</strong></td>
<td>East New Britain Province: Nonga General Hospital Nonga General Hospital Paediatric team visits to Butuwin Health Centre</td>
<td>All patients recruited through Children’s Ward and Children’s Outpatient and Consultation Clinics</td>
</tr>
<tr>
<td><strong>TIMELINE</strong></td>
<td>March 2016 to August 2016</td>
<td>5 month period</td>
</tr>
<tr>
<td><strong>POPULATION</strong></td>
<td>Children 0 – 23 months of age</td>
<td>Any child born within 23 months of the date of interview. Age determined using birth date in Clinic Book</td>
</tr>
<tr>
<td><strong>SAMPLING METHOD</strong></td>
<td>Convenience (stratified) sampling</td>
<td>Sample size determined using online GNU Sampsize Calculator N=101 per IYCF indicator</td>
</tr>
<tr>
<td><strong>DATA COLLECTION</strong></td>
<td>One-on-one interview with primary caregivers using a structured questionnaire</td>
<td>Questionnaire form contained patient and caregiver details, patient’s anthropometry and closed ended questions regarding infant and young child feeding practices</td>
</tr>
<tr>
<td><strong>DATA ANALYSIS</strong></td>
<td>Microsoft Excel and SPSS Version 23</td>
<td>Statistical significance of study results using Pearson chi square and Fisher’s exact test</td>
</tr>
</tbody>
</table>
ETHICAL CONSIDERATIONS

- No Nonga Hospital Research Ethics Committee therefore Directorate of Medical Services informed prior to research being carried out

- Study reviewed with immediate supervisor Dr Beryl Vetuna and with Professor John Vince

- Informed signed or verbal consent prior to survey

- Principles of ethics upheld: no coercion was employed, no study participant was harmed in the course of this study and beneficial advice and interventions were given where needed.
### STUDY PARTICIPANT SELECTION CRITERIA

#### INCLUSION CRITERIA

Any child:

1. Resides in East New Britain Province
2. Birth date documented and verified
3. No significant change in feeding 24 hours prior to interview
4. No condition preventing feeding within the 24 hours prior to interview
5. No severe congenital abnormality
6. Living with the caregiver for > 1 month

#### EXCLUSION CRITERIA

Any child:

1. Not a resident of East New Britain Province
2. Caregiver did not give consent
3. Birth date was not known or could not be verified
4. Feeding had changed significantly within 24 hours prior to interview
5. Brought in by a person other than the primary caregiver
6. Had a condition preventing feeding within 24 hours prior to interview or a severe congenital anomaly
1. Study participants were recruited from among children presenting:
   i. With stable conditions admitted to the Children’s Ward
   ii. For review at the Children’s Outpatient Department
   iii. For review at the Consultation Clinics
   iv. For review at the Nonga Paediatric Team visits to Butuwin Health Centre

2. Participants’ anthropometry measured and recorded. Nutritional status in terms of mid-upper arm circumference, weight for age and weight for length determined using standard WHO/Unicef and PNG Paediatric standard charts.

3. Using 24 hour dietary recall method, the child’s feeding was assessed during a one on one interview with the primary caregiver using a structured questionnaire and recorded for children in age ranges defined by WHO.
Indicators for assessing infant and young child feeding practices

Published 2008

For the measurement and improvement of infant and young child feeding practices

Outlines standard indicators for breastfeeding and complementary feeding practices

Most of the indicators focus on the infant or child’s feeding on the previous day
RESULTS

TOTAL NUMBER OF PATIENTS RECRUITED: 178

Patients whose feeding had not changed significantly with illness

NO. OF PATIENTS INCLUDED  
\[ n = 163 \]

Patients whose feeding had changed significantly with illness or had incomplete patient or caregiver information

NO. OF PATIENTS EXCLUDED  
\[ n = 15 \]

NO. OF OUTPATIENTS  \[ N = 141 \]

Nonga Consultation Clinic  64
Butuwin Consultation Clinic  27
Children’s Outpatient  35
Well siblings of sick patients presenting to CWD/A&E/COPD  15

NO. OF INPATIENTS  \[ N = 22 \]

Children’s Ward  22
<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>FREQUENCY (n=163)</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>18</td>
<td>11%</td>
</tr>
<tr>
<td>21 – 30</td>
<td>94</td>
<td>58%</td>
</tr>
<tr>
<td>31 - &gt;45</td>
<td>51</td>
<td>31%</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>163</td>
<td>100%</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>161</td>
<td>99%</td>
</tr>
<tr>
<td>Single parent/divorced/separated</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>101</td>
<td>62%</td>
</tr>
<tr>
<td>Semi-rural (&lt;15 min from nearest town)</td>
<td>39</td>
<td>24%</td>
</tr>
<tr>
<td>Urban</td>
<td>23</td>
<td>14%</td>
</tr>
<tr>
<td>Highest level of education reached</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;Primary level</td>
<td>26</td>
<td>16%</td>
</tr>
<tr>
<td>&gt;Primary level</td>
<td>137</td>
<td>84%</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsistence farmer</td>
<td>117</td>
<td>72%</td>
</tr>
<tr>
<td>No formal employment</td>
<td>13</td>
<td>8%</td>
</tr>
<tr>
<td>Formal employment</td>
<td>33</td>
<td>20%</td>
</tr>
<tr>
<td>Spouse formally employed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76</td>
<td>47%</td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>53%</td>
</tr>
<tr>
<td>Weekly household earnings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;K100</td>
<td>91</td>
<td>56%</td>
</tr>
<tr>
<td>&gt;K100</td>
<td>72</td>
<td>44%</td>
</tr>
</tbody>
</table>
DEMOGRAPHIC CHARACTERISTICS AND OVERALL NUTRITION STATUS OF THE STUDY GROUP

- **Number of patients (n = 163)**
  - Male : Female ratio = 3:1
  - Interquartile range = 4 months
  - Median age = 7 months
  - Age range with highest frequency = 0-6 months
  - Anthropometric deficit:
    - None = 111 (68%)
    - Stunting = 26 (16%)
    - Wasting = 14 (8%)
    - Stunting & wasting = 12 (7%)
  - Immunisation cover for age:
    - Full = 90 (55%)
    - Partial = 73 (45%)

- **Age distribution**:
  - 0-5 months: Male = 39 (39%), Female = 24 (34%)
  - 6-11 months: Male = 42 (34%), Female = 14 (27%)
  - 12-23 months: Male = 21 (34%), Female = 23 (27%)
<table>
<thead>
<tr>
<th>IYCF Indicator</th>
<th>IYCF Indicator as Defined by WHO</th>
<th>This Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Initiation breastfeeding</td>
<td>Proportion of children 0-23 months old who were put to the breast within 1 hour of birth</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td></td>
<td>103</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63%</td>
</tr>
<tr>
<td>Exclusive breastfeeding under 6 months</td>
<td>Proportion of infants 0-5 months old exclusively breastfed during the previous day</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>73%</td>
</tr>
<tr>
<td>Continued breastfeeding at 1 year</td>
<td>Proportion of children 12-15 months old who were fed breast milk during the previous day</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>82%</td>
</tr>
<tr>
<td>Continued breastfeeding at 2 years</td>
<td>Proportion of children 20-23 months who were fed breast milk during the previous day</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29%</td>
</tr>
<tr>
<td>Bottle feeding</td>
<td>Proportion of children 0-23 months old who were fed with a bottle during the previous day</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8%</td>
</tr>
</tbody>
</table>
Breastfeeding Practices

Prevalence of bottle feeding: 8%

Reasons for bottle feeding:
- Working mother: 3 (23%)
- Maternal death or illness: 1 (8%)
- Perceived poor maternal milk supply: 7 (54%)
- Poor breast attachment: 2 (15%)

Source of feeding bottle:
- Purchased from a retail outlet: 31%
- Purchased from a pharmacy without a prescription: 69%

All of the caregivers (100%) obtained a feeding bottle without a prescription.
<table>
<thead>
<tr>
<th>IYCF Indicator</th>
<th>IYCF Indicator as Defined by WHO</th>
<th>This Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of solid, semisolid or soft food</td>
<td>Proportion of infants 6-8 months who received solid, semi-solid or soft foods the previous day</td>
<td>40  40  100</td>
</tr>
<tr>
<td>Minimum dietary diversity</td>
<td>Proportion of children 6-23 months who received food from 4 or more of the 7 food groups the previous day</td>
<td>100  25  25</td>
</tr>
<tr>
<td>Minimum meal frequency (breastfed)</td>
<td>Proportion of breastfed children 6-8 months who received 2-3 meals or 9-23 months who received 3-4 meals with 1-2 snacks in the previous day</td>
<td>83  55  66</td>
</tr>
<tr>
<td>Minimum meal frequency (non-breastfed)</td>
<td>Proportion of non-breastfed children 6-23 months who received 1-2 cups milk and 1-2 extra meals the previous day</td>
<td>17  7  41</td>
</tr>
<tr>
<td>Minimum acceptable diet (breastfed)</td>
<td>Proportion of breastfed children 6-23 months old who received minimum meal diversity and frequency the previous day</td>
<td>83  19  23</td>
</tr>
<tr>
<td>Minimum acceptable diet (non-breastfed)</td>
<td>Proportion of non-breastfed children 6-23 months old who received minimum meal diversity and frequency the previous day</td>
<td>17  5  29</td>
</tr>
</tbody>
</table>
COMPLEMENTARY FEEDING PRACTICES

Introduction of solid, semi-solid, soft food 6-8m
- Nonga Study [2016]: 46%
- Indonesia Study [2007]: 28%
- Rwanda Study [2005]: 23%

Minimum meal frequency (breastfed child) 6-23m
- Nonga Study [2016]: 66%
- Indonesia Study [2007]: 28%
- Rwanda Study [2005]: 25%

Minimum dietary diversity 6-23m
- Nonga Study [2016]: 44%
- Indonesia Study [2007]: 44%
- Rwanda Study [2005]: 42%

Minimum acceptable diet (breastfed child) 6-23m
- Nonga Study [2016]: 67%
- Indonesia Study [2007]: 67%
- Rwanda Study [2005]: 67%

Mean= 4 meals consumed the day before interview
Though minimum meal frequency is high, 77% of breast fed and 71% of non-breast fed study participants had a poor minimum acceptable diet due to poor dietary diversity (<4 of the required 7 food groups consumed).

**FOOD GROUPS CONSUMED**

- Other fruits and vegetables: 36%
- Vitamin A rich fruits & vegetables: 5%
- Eggs: 11%
- Flesh foods (meat, poultry and liver): 14%
- Dairy products: 8%
- Legumes, nuts: 3%
- Grains, root vegetables, tubers: 22%

**Median no. food groups consumed:**
- **6-8 months:** 3 food groups consumed
- **9-23 months:** 5 food groups consumed
INFANT AND YOUNG CHILD FEEDING ADVICE FROM A HEALTH WORKER IN THE LAST 24 MONTHS

- No advice: 27%
- Breastfeeding advice: 33%
- Complementary feeding advice: 40%
- Breastfeeding and complementary feeding advice: 0.01%

n = 163
### FACTORS FAVOURABLY ASSOCIATED WITH OPTIMAL IYCF PRACTICES

#### BREAST FEEDING: EXCLUSIVE BREAST FEEDING (0-5 months)

**Total:** $n = 56$
- **Exclusive BF** $N = 39$
- **Non-exclusive BF** $N = 17$

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>EXCLUSIVELY BREAST FEEDING</th>
<th>NON-EXCLUSIVELY BREAST FEEDING</th>
<th>P-VALUE (Pearson/Fisher exact test)</th>
<th>SIGNIFICANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver exposed to IYCF advice</td>
<td>28 (39) 72%</td>
<td>4 (17) 24%</td>
<td>&lt;0.001</td>
<td>Yes</td>
</tr>
<tr>
<td>Weekly household earning &gt;K100</td>
<td>17 (39) 44%</td>
<td>9 (17) 53%</td>
<td>0.519</td>
<td>No</td>
</tr>
<tr>
<td>Caregiver education ≥ Primary level</td>
<td>23 (39) 59%</td>
<td>12 (17) 71%</td>
<td>0.409</td>
<td>No</td>
</tr>
<tr>
<td>Caregiver’s spouse formally employed</td>
<td>15 (39) 38%</td>
<td>11 (17) 65%</td>
<td>0.070</td>
<td>No</td>
</tr>
</tbody>
</table>

#### COMPLEMENTARY FEEDING: MINIMUM ACCEPTABLE DIET (6-23 months, breastfed)

**Total:** $n = 83$
- **Received MAD** $N = 19$
- **Did not receive MAD** $N = 64$

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>RECEIVED MINIMUM ACCEPTABLE DIET</th>
<th>DID NOT RECEIVED MINIMUM ACCEPTABLE DIET</th>
<th>P-VALUE (Pearson chi square)</th>
<th>SIGNIFICANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver exposed to IYCF advice</td>
<td>15 (19) 79%</td>
<td>35 (64) 55%</td>
<td>0.058</td>
<td>No</td>
</tr>
<tr>
<td>Weekly household earning &gt;K100</td>
<td>17 (19) 89%</td>
<td>12 (64) 18%</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>Caregiver education ≥ Primary level</td>
<td>16 (19) 84%</td>
<td>41 (64) 64%</td>
<td>0.096</td>
<td>No</td>
</tr>
<tr>
<td>Caregiver’s spouse formally employed</td>
<td>11 (19) 58%</td>
<td>16 (64) 25%</td>
<td>0.007</td>
<td>Yes</td>
</tr>
<tr>
<td>Child age &gt; 8 months old</td>
<td>17 (19) 89%</td>
<td>18 (64) 28%</td>
<td>0.000</td>
<td>Yes</td>
</tr>
<tr>
<td>NONGA STUDY FINDINGS</td>
<td>COMPARATIVE LITERATURE REVIEW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **1** High prevalence early initiation of breast feeding 67% | **Early initiation of breastfeeding 71%**  
| **2** 70% exclusively breast fed 0-5m infants             | **Exclusive breastfeeding 0-5m 50.3%**  
| **3** Despite high rate of continued breastfeeding at 1 year (82%), continued breastfeeding among 2 year olds in the study group was low (29%) | **35% prevalence of breastfeeding beyond 1 year**  
| **4** 8% of 0-23m infants bottle fed. All caregivers (100%) obtained a feeding bottle without prescription. Most common reason perceived insufficiency of maternal milk supply (54%) | **20% of 1822 mothers surveyed in Papua New Guinea in 1995 had used bottle feeding**  
| **5** Minimum meal frequency for breast fed (66%) and non-breast fed (41%) children 6-23m children. Dietary diversity poor (25%). | **12.6% children received recommended dietary diversity**  
| **6** Exposure to IYCF advice was significantly associated with optimal breastfeeding but not with optimal complementary feeding | **Greater odds (AOR 2.62) of optimal IYCF feeding with exposure of mothers to IYCF nutrition education (via media)**  
1. The practice of exclusive breastfeeding in the first 6 months of life found to be optimal while complementary feeding practices were suboptimal. Children in East New Britain are not being fed a diverse diet to provide all their nutritional requirements however dietary diversity appears to increase with age

2. With regards to the null hypothesis:

   Exposure to infant and young child feeding advice from a health worker was found to be significantly associated with optimal breast feeding practices (p=<0.001) but not with optimal complementary feeding practices (p=0.058)

3. Other factors favourably associated with optimal complementary feeding practices were:
   - Caregiver’s spouse formally employed (p = 0.007)
   - Weekly household earning >K100 (p = 0.000)
   - Child’s age >8 months old (p = 0.000)

4. Despite the existence of the Baby Feed Supplies (Control) Act 1977, findings from this study indicate that feeding bottles can be obtained easily in East New Britain without health worker prescription
1. Provide IMCI and IYCF training for staff in main hospitals and rural health facilities in East New Britain Province to equip them with the knowledge on proper infant and young child feeding practices

2. IYCF advice to mothers should include advice about factors that influence lactation as 'perceived poor maternal milk supply' is a common reason mothers start bottle feeding and may be one of the reasons for introduction of soft diet for infants less than 6 months of age (Ref: 10 Step Checklist - Step 9A)

3. Unlawful sale of feeding bottles to be brought to the attention of East New Britain Provincial Health Department to enforce the Baby Feed Supplies (Control) Act 1977 and ensure that baby feed supplies are obtained by health worker prescription only.

4. Paediatric and O&G teams to work with Nonga General Hospital administration to implement Baby-friendly Hospital Initiative strategies

5. More trained nutrition nurses/nutritionists needed to staff nutrition units in major hospitals to support the promotion of optimal IYCF practices

6. Implementation of the strategies outlined in the National Infant and Young Child Feeding Policy
Study design limitations

- This was a hospital based study wherein most of the study participants were ill prior to interview. A community based study involving well children could be conducted to compare results.

Data limitations

- Sample size per age category was small and limited by time. A study over an extended period may reveal more about infant and young child feeding in East New Britain Province. Additionally, recall bias may have affected data.

Impact limitations

- The study was conducted only in East New Britain and results may or may not be similar if conducted in other provinces in Papua New Guinea. A study on infant feeding practices in all regions may shed more light on the situation in Papua New Guinea.
ACKNOWLEDGEMENTS

1. All study participants and their caregivers
2. Immediate supervisor Dr Beryl Vetuna
3. Professor John Vince, UPNG School of Medicine and Health Science
4. Dr Paul Wari, Paediatric Resident MOs and HEOs, nursing staff of Children’s Ward and Consultation Clinic
5. Sr. Elisabeth Noah, OIC of the Nonga Nutrition Unit
6. Dr Tommy Walters and the nursing staff of Nonga Children’s Outpatient Department
7. Dr Danny Toti, Rural Health Outreach Co-ordinator
8. OIC and nursing staff of Butuwin Health Centre
REFERENCES