Does Victim Gender Matter for Justice Delivery? Police and Judicial Responses to Women's Cases in India

Chuchu Wen & Priscila Stisman

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Introduction

- **Research Question:** Are women disadvantaged when accessing justice in India compared to men, and if so how?
- **Hypothesis:** Women in India face 'multi-stage' discrimination when accessing justice, encountering systemic barriers at sequential stages of the justice process, including police registration, investigation, trial, and verdict.
- **Data:** 418,190 police reports in Haryana from January 2015 to November 2018.

Methods

- **OLS Modeling:** to analyze whether women's cases are less likely than men's to be sent to court (VAW vs. non-VAW cases)
- **Topic Modeling**: Are there topics in the victims' testimonies—including inside women's complaints—that yield low convictions for suspects?
- **Topical Inverse Regression Matching**

Structural Topic Models STMs

What is?

- Can predict whether cases devoted to a topic (e.g. rape) are functions of covariates
- Disaggregates what citizens told the police happened to them using statistical associations between words. e.g.: distinguish between domestic violence versus domestic violence that also included murder attempt

Goals

- (1) give voice to victims by utilizing their own words,
- (2) highlight the severity of claims, especially VAW, and
- (3) coarsen high-dimensional data to allow for text matching techniques.

STMs

- **Step 1:** Data Preprocessing. Cleans and tokenizes the text and retains metadata, which contains additional information about each document (e.g., gender of the complainant, whether the person was convicted, etc.)
- **Step 2:** Preparing Documents for STM: refine data, filtering out rare words that appear in fewer than 50 documents
- **Step 3:** Running the STM Model ($K = 32$ topics) in different subsets of the corpus
- **Step 4:** Assign Topic Labels

STMs: corpus subsets

Run STMs in different corpora and analyze topics within those

- All crime
- Female Compainant
- VAW reports

STMs with FREX measures

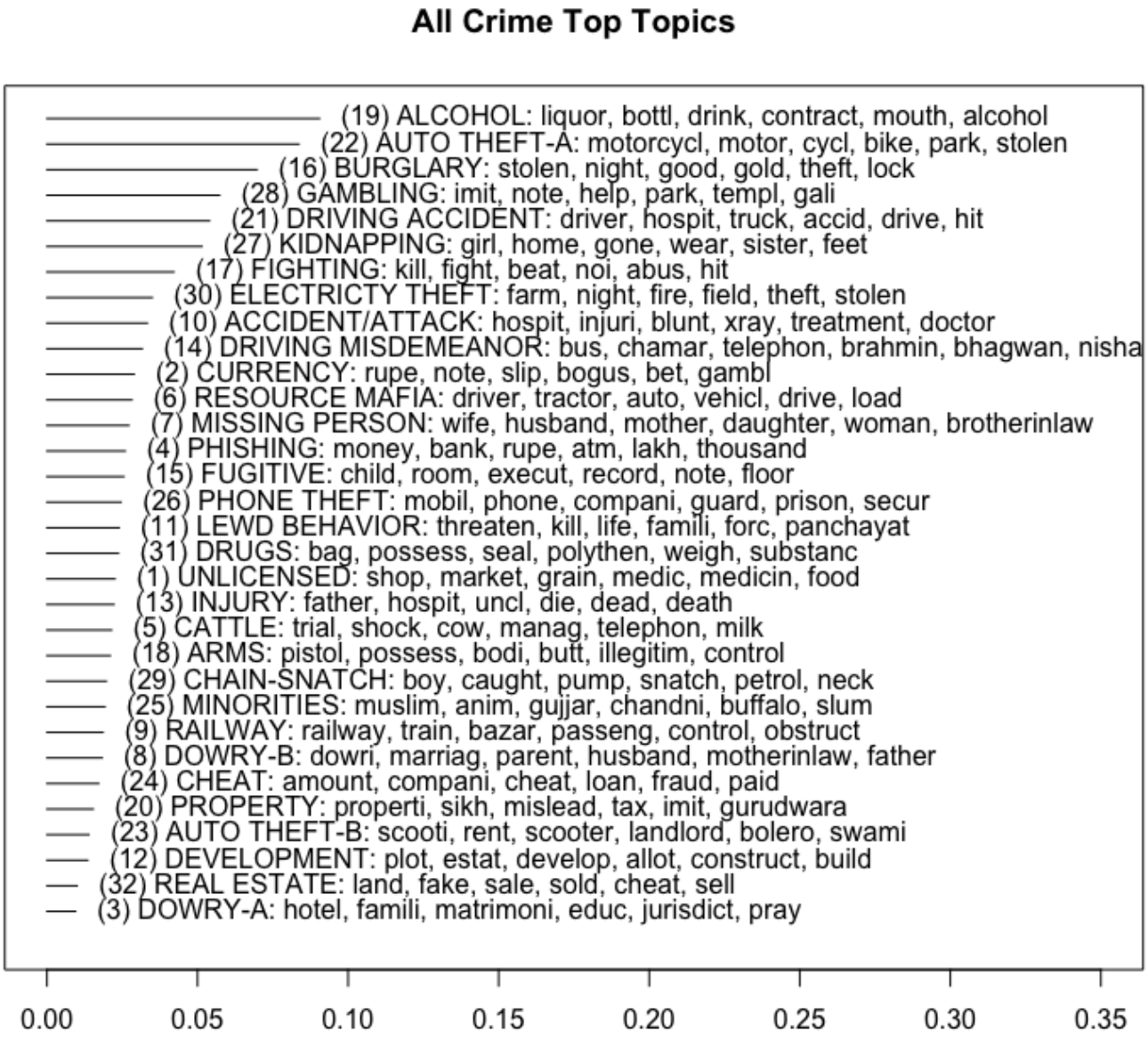
FREX (short for Frequency and Exclusivity) is a measure used in STMs to identify words that are both frequent within a topic and exclusive to that topic (highlight words that make a topic more distinguishable from others)

- High Probability Words: These words appear frequently in a topic but might also appear in other topics.
- Exclusive Words: These words are more unique to a single topic but might not be the most frequent ones.
- FREX Score: FREX balances frequency and exclusivity to identify words that are both common and distinctive for a topic.

Top Topics Code Example

```r
## Running Model (1)
test2 <- stm(documents = out$documents, vocab = out$vocab,
             K = 32,
             prevalence =~ complainant_gender + gendered + urban + convicted + acquitted + dismissed, # Multiple covariates
             max.em.its = 75,
             data = out$meta, init.type = "Spectral",
             verbose = TRUE)
```

Results


All Crime Top Topics
(19) ALCOHOL: liquor, bottl, drink, contract, mouth, alcohol
(22) AUTO THEFT-A: motorcycl, motor, cycl, bike, park, stolen
(16) BURGLARY: stolen, night, good, gold, theft, lock
(28) GAMBLING: imit, note, help, park, templ, gali
(21) DRIVING ACCIDENT: driver, hospit, truck, accid, drive, hit
(27) KIDNAPPING: girl, home, gone, wear, sister, feet
(17) FIGHTING: kill, fight, beat, noi, abus, hit
(30) ELECTRICTY THEFT: farm, night, fire, field, theft, stolen
(10) ACCIDENT/ATTACK: hospit, injuri, blunt, xray, treatment, doctor
(14) DRIVING MISDEMEANOR: bus, chamar, telephon, brahmin, bhagwan, nisha
(2) CURRENCY: rupe, note, slip, bogus, bet, gambl
(6) RESOURCE MAFIA: driver, tractor, auto, vehicl, drive, load
(7) MISSING PERSON: wife, husband, mother, daughter, woman, brotherinlaw
(4) PHISHING: money, bank, rupe, atm, lakh, thousand
(15) FUGITIVE: child, room, execut, record, note, floor
(26) PHONE THEFT: mobil, phone, compani, guard, prison, secur
(11) LEWD BEHAVIOR: threaten, kill, life, famili, forc, panchayat
(31) DRUGS: bag, possess, seal, polythen, weigh, substanc
(1) UNLICENSED: shop, market, grain, medic, medicin, food
(13) INJURY: father, hospit, uncl, die, dead, death
(5) CATTLE: trial, shock, cow, manag, telephon, milk
(18) ARMS: pistol, possess, bodi, butt, illegitim, control
(29) CHAIN-SNATCH: boy, caught, pump, snatch, petrol, neck
(25) MINORITIES: muslim, anim, gujjar, chandni, buffalo, slum
(9) RAILWAY: railway, train, bazar, passeng, control, obstruct
(8) DOWRY-B: dowri, marriag, parent, husband, motherinlaw, father
(24) CHEAT: amount, compani, cheat, loan, fraud, paid
(20) PROPERTY: properti, sikh, mislead, tax, imit, gurudwara
(23) AUTO THEFT-B: scooti, rent, scooter, landlord, bolero, swami
(12) DEVELOPMENT: plot, estat, develop, allot, construct, build
(32) REAL ESTATE: land, fake, sale, sold, cheat, sell
(3) DOWRY-A: hotel, famili, matrimoni, educ, jurisdict, pray
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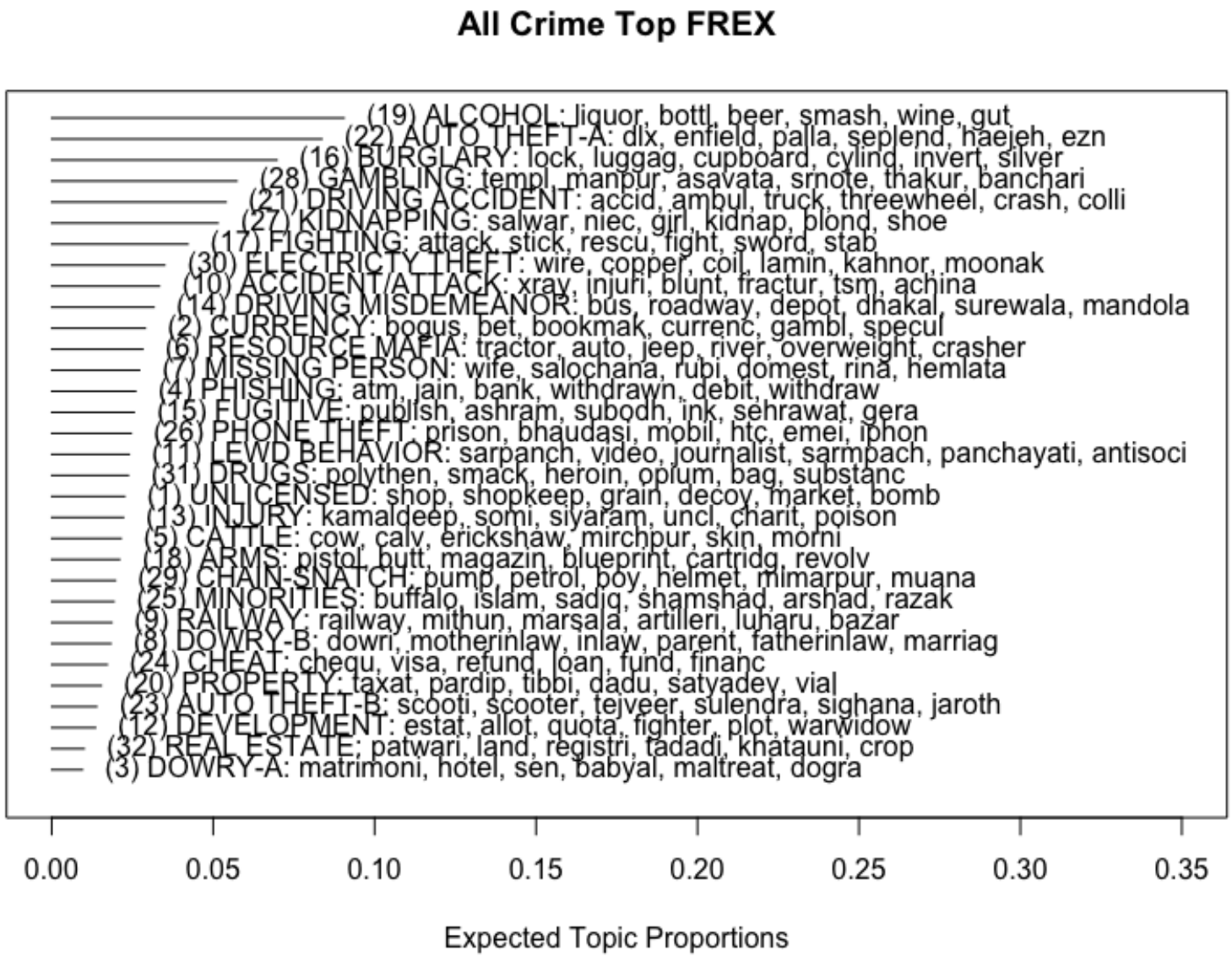
Results


All Crime Top FREX
(19) ALCOHOL: liquor, bottl, beer, smash, wine, gut
(22) AUTO THEFT-A: dlx, enfield, palla, seplend, haejeh, ezn
(16) BURGLARY: lock, luggag, cupboard, cylind, invert, silver
(28) GAMBLING: templ, manpur, asavata, srnote, thakur, banchari
(21) DRIVING ACCIDENT: accid, ambul, truck, threewheel, crash, colli
(27) KIDNAPPING: salwar, niec, girl, kidnap, blond, shoe
(17) FIGHTING: attack, stick, rescu, fight, sword, stab
(30) ELECTRICTY THEFT: wire, copper, coil, lamin, kahnor, moonak
(10) ACCIDENT/ATTACK: xray, injuri, blunt, fractur, tsm, achina
(14) DRIVING MISDEMEANOR: bus, roadway, depot, dhakal, surewala, mandola
(2) CURRENCY: bogus, bet, bookmak, currenc, gambl, specul
(6) RESOURCE MAFIA: tractor, auto, jeep, river, overweight, crasher
(7) MISSING PERSON: wife, salochana, rubi, domest, rina, hemlata
(4) PHISHING: atm, jain, bank, withdrawn, debit, withdraw
(15) FUGITIVE: publish, ashram, subodh, ink, sehrawat, gera
(26) PHONE THEFT: prison, bhaudasi, mobil, htc, emei, iphon
(11) LEWD BEHAVIOR: sarpanch, video, journalist, sarmpach, panchayati, antisoci
(31) DRUGS: polythen, smack, heroin, opium, bag, substanc
(1) UNLICENSED: shop, shopkeep, grain, decoy, market, bomb
(13) INJURY: kamaldeep, somi, siyaram, uncl, charit, poison
(5) CATTLE: cow, calv, erickshaw, mirchpur, skin, morni
(18) ARMS: pistol, butt, magazin, blueprint, cartridg, revolv
(29) CHAIN-SNATCH: pump, petrol, boy, helmet, mimarpur, muana
(25) MINORITIES: buffalo, islam, sadiq, shamshad, arshad, razak
(9) RAILWAY: railway, mithun, marsala, artilleri, luharu, bazar
(8) DOWRY-B: dowri, motherinlaw, inlaw, parent, fatherinlaw, marriag
(24) CHEAT: chequ, visa, refund, loan, fund, financ
(20) PROPERTY: taxat, pardip, tibbi, dadu, satyadev, vial
(23) AUTO THEFT-B: scooti, scooter, tejveer, sulendra, sighana, jaroth
(12) DEVELOPMENT: estat, allot, quota, fighter, plot, warwidow
(32) REAL ESTATE: patwari, land, registri, tadadi, khatauni, crop
(3) DOWRY-A: matrimoni, hotel, sen, babyal, maltreat, dogra
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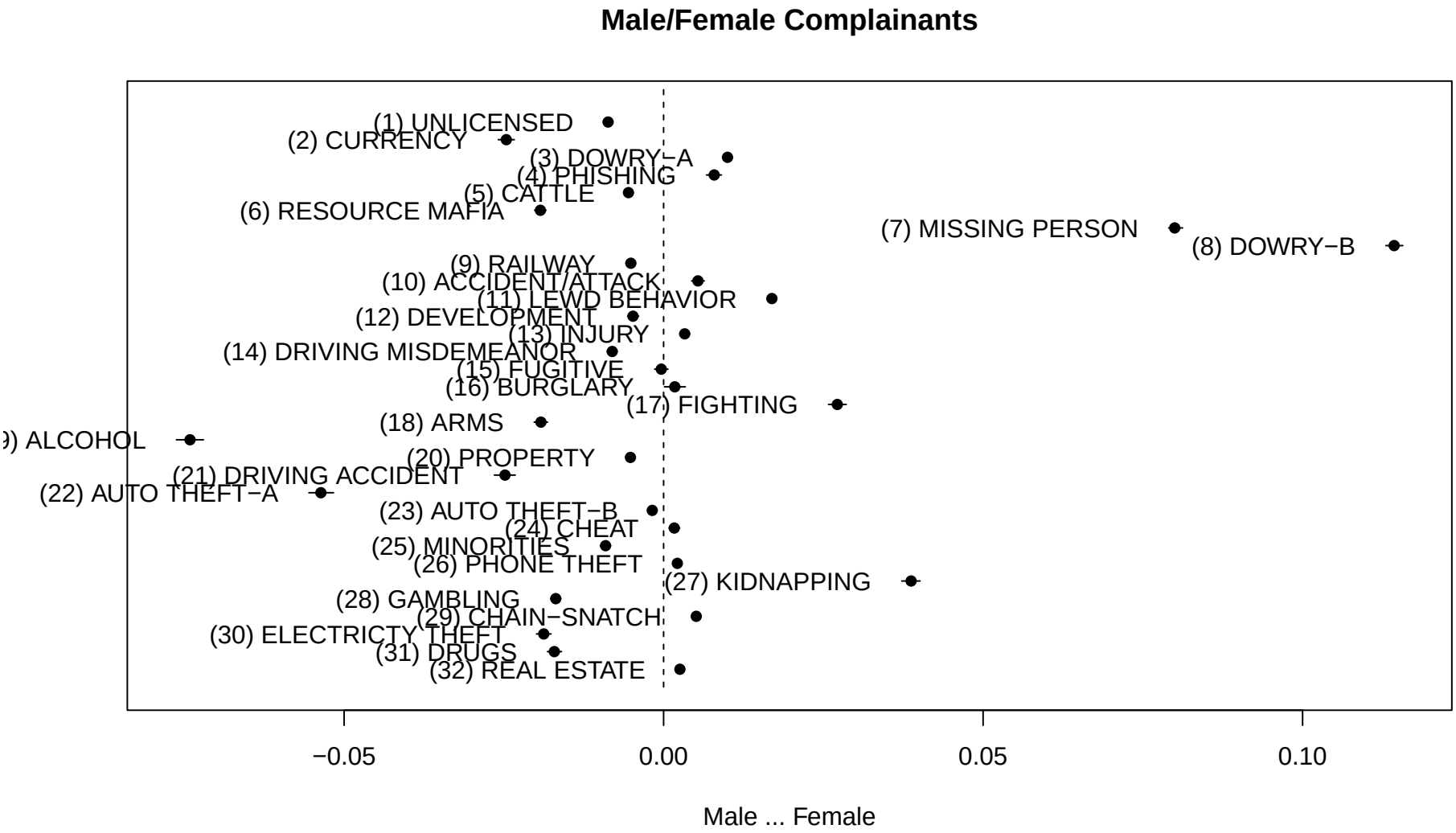
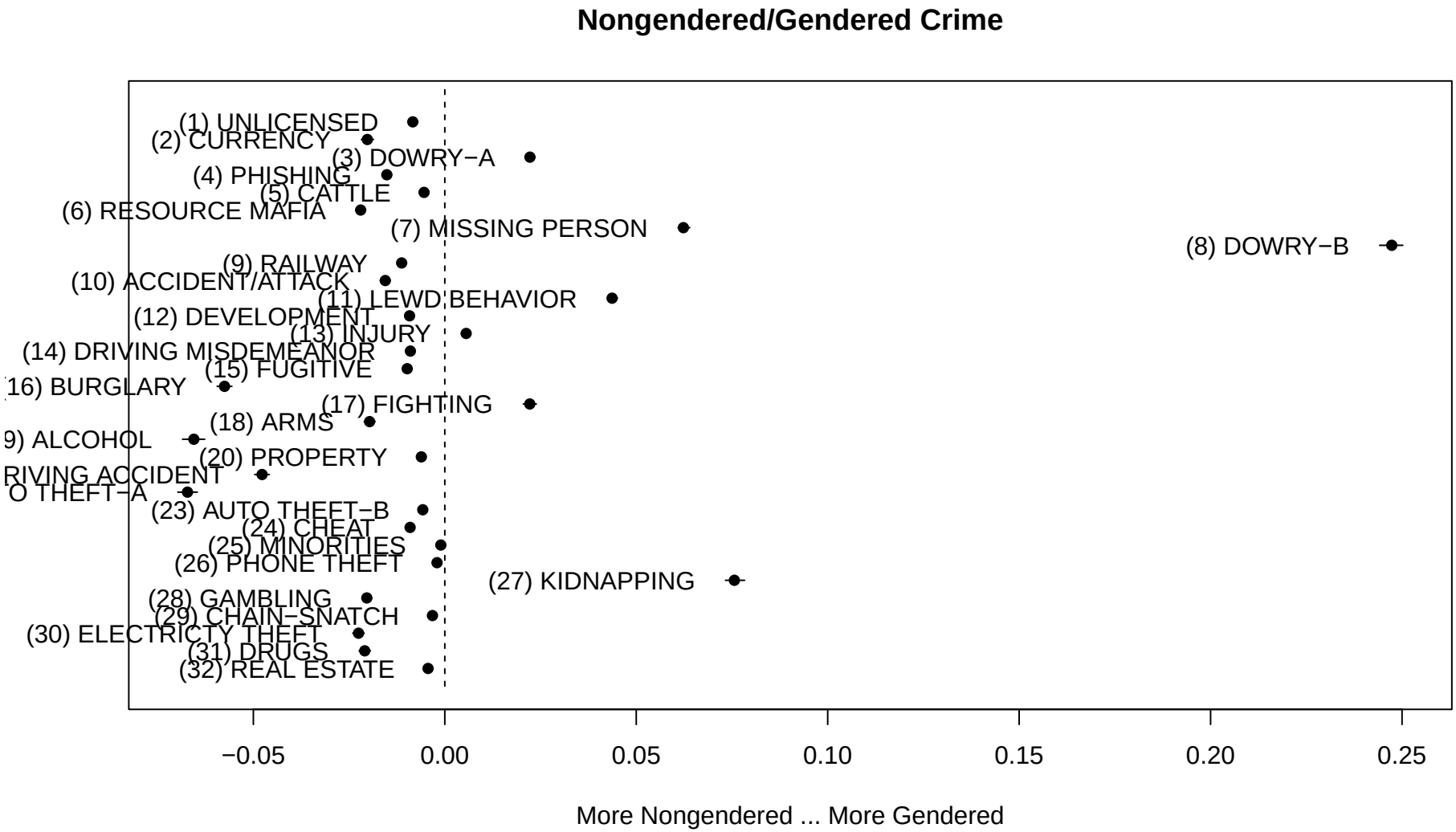
0.35
Expected Topic Proportions

Results


Male/Female Complainants
(1) UNLICENSED
(2) CURRENCY
(3) DOWRY−A
(4) PHISHING
(5) CATTLE
(6) RESOURCE MAFIA
(7) MISSING PERSON
(8) DOWRY−B
(9) RAILWAY
(10) ACCIDENT/ATTACK
(11) LEWD BEHAVIOR
(12) DEVELOPMENT
(13) INJURY
(14) DRIVING MISDEMEANOR
(15) FUGITIVE
(16) BURGLARY
(17) FIGHTING
(18) ARMS
) ALCOHOL
(20) PROPERTY
(21) DRIVING ACCIDENT
(22) AUTO THEFT−A
(23) AUTO THEFT−B
(24) CHEAT
(25) MINORITIES
(26) PHONE THEFT
(27) KIDNAPPING
(28) GAMBLING
(29) CHAIN−SNATCH
(30) ELECTRICTY THEFT
(31) DRUGS
(32) REAL ESTATE
−0.05
0.00
0.05
0.10
Male ... Female

Results


Nongendered/Gendered Crime
(1) UNLICENSED
(2) CURRENCY
(3) DOWRY−A
(4) PHISHING
(5) CATTLE
(6) RESOURCE MAFIA
(7) MISSING PERSON
(8) DOWRY−B
(9) RAILWAY
(10) ACCIDENT/ATTACK
(11) LEWD BEHAVIOR
(12) DEVELOPMENT
(13) INJURY
(14) DRIVING MISDEMEANOR
(15) FUGITIVE
16) BURGLARY
(17) FIGHTING
(18) ARMS
9) ALCOHOL
(20) PROPERTY
RIVING ACCIDENT
O THEFT−A
(23) AUTO THEFT−B
(24) CHEAT
(25) MINORITIES
(26) PHONE THEFT
(27) KIDNAPPING
(28) GAMBLING
(29) CHAIN−SNATCH
(30) ELECTRICTY THEFT
(31) DRUGS
(32) REAL ESTATE
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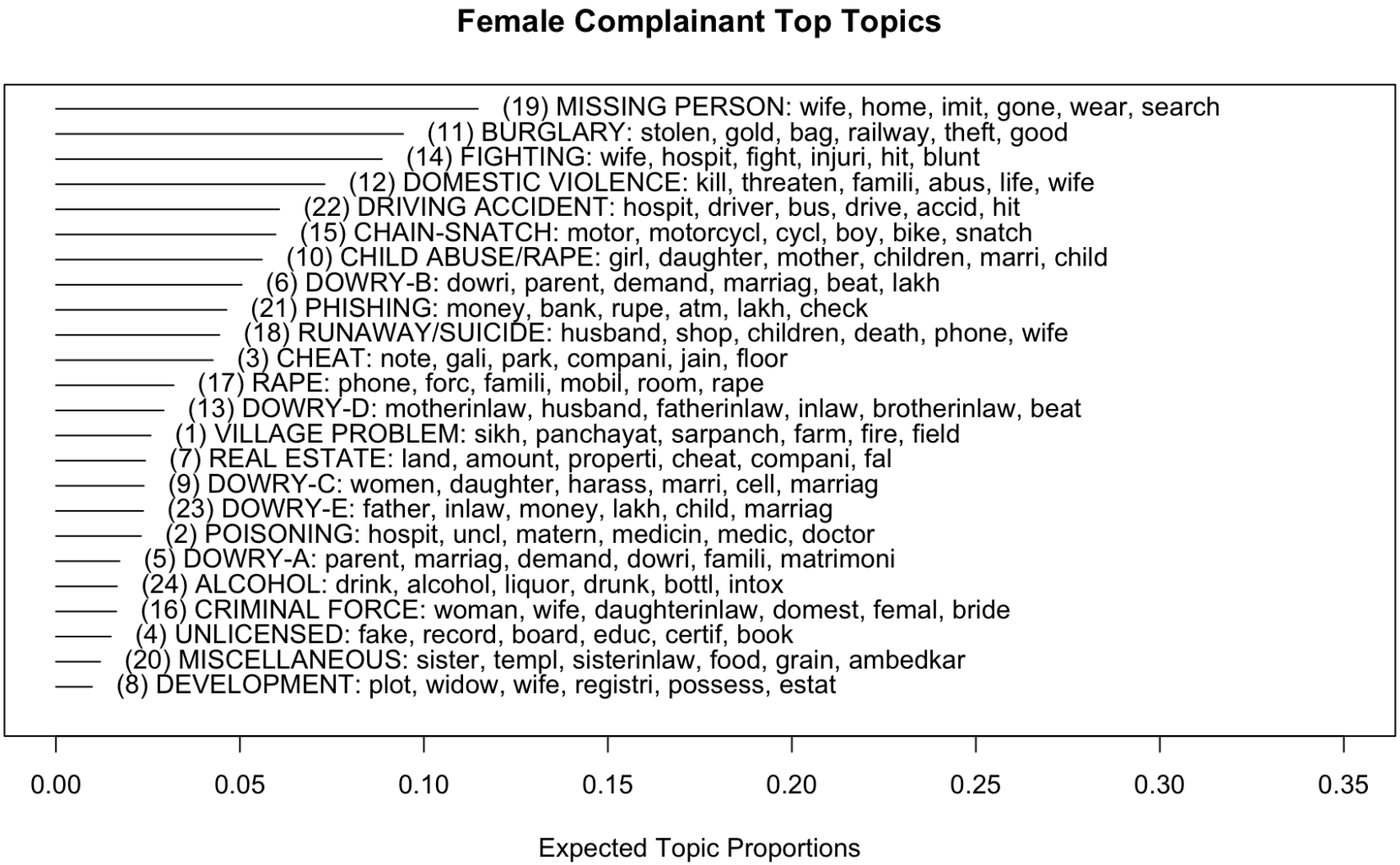
More Nongendered ... More Gendered

Results


Female Complainant Top Topics
(19) MISSING PERSON: wife, home, imit, gone, wear, search
(11) BURGLARY: stolen, gold, bag, railway, theft, good
(14) FIGHTING: wife, hospit, fight, injuri, hit, blunt
(12) DOMESTIC VIOLENCE: kill, threaten, famili, abus, life, wife
(22) DRIVING ACCIDENT: hospit, driver, bus, drive, accid, hit
(15) CHAIN-SNATCH: motor, motorcycl, cycl, boy, bike, snatch
(10) CHILD ABUSE/RAPE: girl, daughter, mother, children, marri, child
(6) DOWRY-B: dowri, parent, demand, marriag, beat, lakh
(21) PHISHING: money, bank, rupe, atm, lakh, check
(18) RUNAWAY/SUICIDE: husband, shop, children, death, phone, wife
(3) CHEAT: note, gali, park, compani, jain, floor
(17) RAPE: phone, forc, famili, mobil, room, rape
(13) DOWRY-D: motherinlaw, husband, fatherinlaw, inlaw, brotherinlaw, beat
(1) VILLAGE PROBLEM: sikh, panchayat, sarpanch, farm, fire, field
(7) REAL ESTATE: land, amount, properti, cheat, compani, fal
(9) DOWRY-C: women, daughter, harass, marri, cell, marriag
(23) DOWRY-E: father, inlaw, money, lakh, child, marriag
(2) POISONING: hospit, uncl, matern, medicin, medic, doctor
(5) DOWRY-A: parent, marriag, demand, dowri, famili, matrimoni
(24) ALCOHOL: drink, alcohol, liquor, drunk, bottl, intox
(16) CRIMINAL FORCE: woman, wife, daughterinlaw, domest, femal, bride
(4) UNLICENSED: fake, record, board, educ, certif, book
(20) MISCELLANEOUS: sister, templ, sisterinlaw, food, grain, ambedkar
(8) DEVELOPMENT: plot, widow, wife, registri, possess, estat
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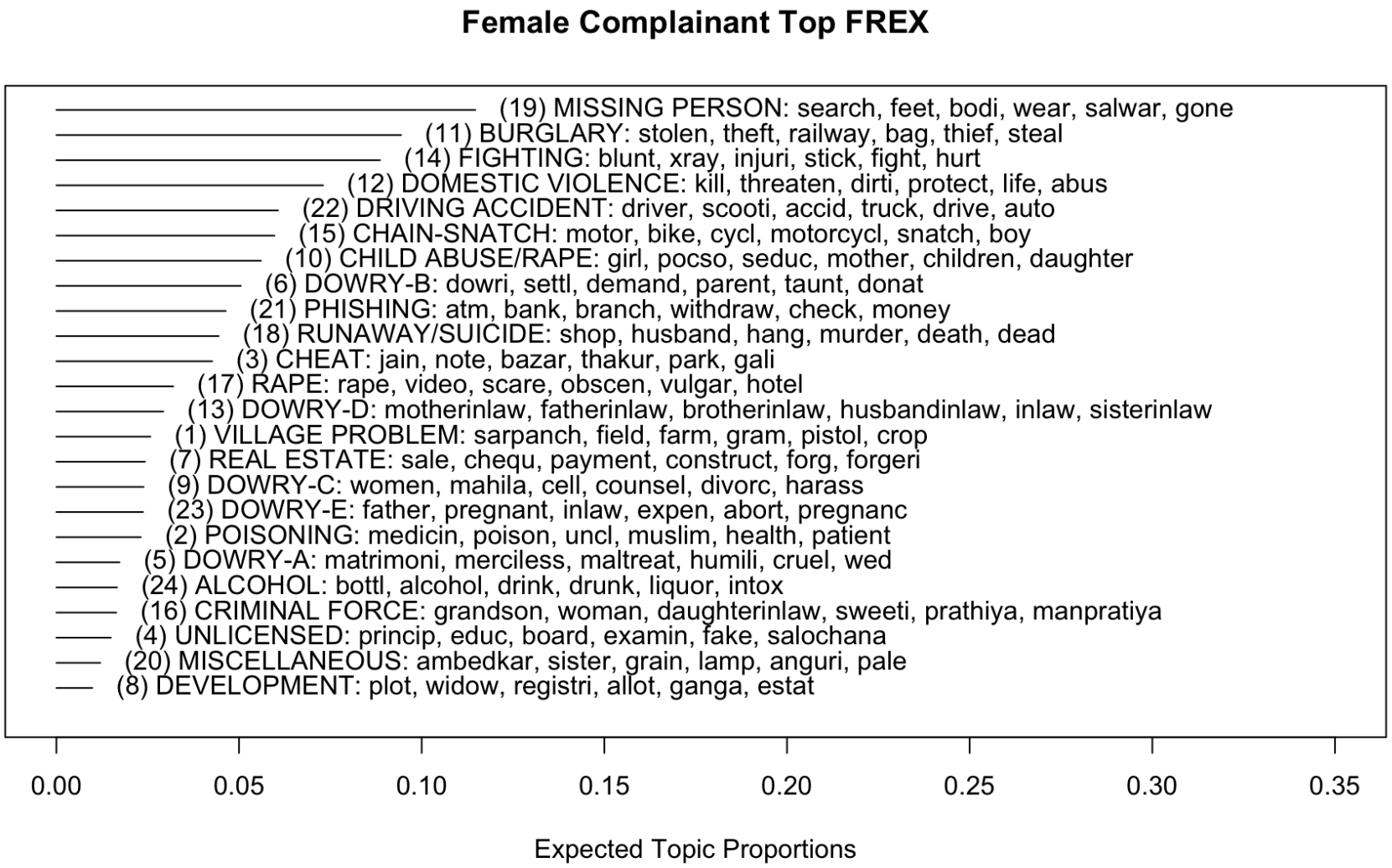
Expected Topic Proportions

Results


Female Complainant Top FREX
(19) MISSING PERSON: search, feet, bodi, wear, salwar, gone
(11) BURGLARY: stolen, theft, railway, bag, thief, steal
(14) FIGHTING: blunt, xray, injuri, stick, fight, hurt
(12) DOMESTIC VIOLENCE: kill, threaten, dirti, protect, life, abus
(22) DRIVING ACCIDENT: driver, scooti, accid, truck, drive, auto
(15) CHAIN-SNATCH: motor, bike, cycl, motorcycl, snatch, boy
(10) CHILD ABUSE/RAPE: girl, pocso, seduc, mother, children, daughter
(6) DOWRY-B: dowri, settl, demand, parent, taunt, donat
(21) PHISHING: atm, bank, branch, withdraw, check, money
(18) RUNAWAY/SUICIDE: shop, husband, hang, murder, death, dead
(3) CHEAT: jain, note, bazar, thakur, park, gali
(17) RAPE: rape, video, scare, obscen, vulgar, hotel
(13) DOWRY-D: motherinlaw, fatherinlaw, brotherinlaw, husbandinlaw, inlaw, sisterinlaw
(1) VILLAGE PROBLEM: sarpanch, field, farm, gram, pistol, crop
(7) REAL ESTATE: sale, chequ, payment, construct, forg, forgeri
(9) DOWRY-C: women, mahila, cell, counsel, divorc, harass
(23) DOWRY-E: father, pregnant, inlaw, expen, abort, pregnanc
(2) POISONING: medicin, poison, uncl, muslim, health, patient
(5) DOWRY-A: matrimoni, merciless, maltreat, humili, cruel, wed
(24) ALCOHOL: bottl, alcohol, drink, drunk, liquor, intox
(16) CRIMINAL FORCE: grandson, woman, daughterinlaw, sweeti, prathiya, manpratiya
(4) UNLICENSED: princip, educ, board, examin, fake, salochana
(20) MISCELLANEOUS: ambedkar, sister, grain, lamp, anguri, pale
(8) DEVELOPMENT: plot, widow, registri, allot, ganga, estat
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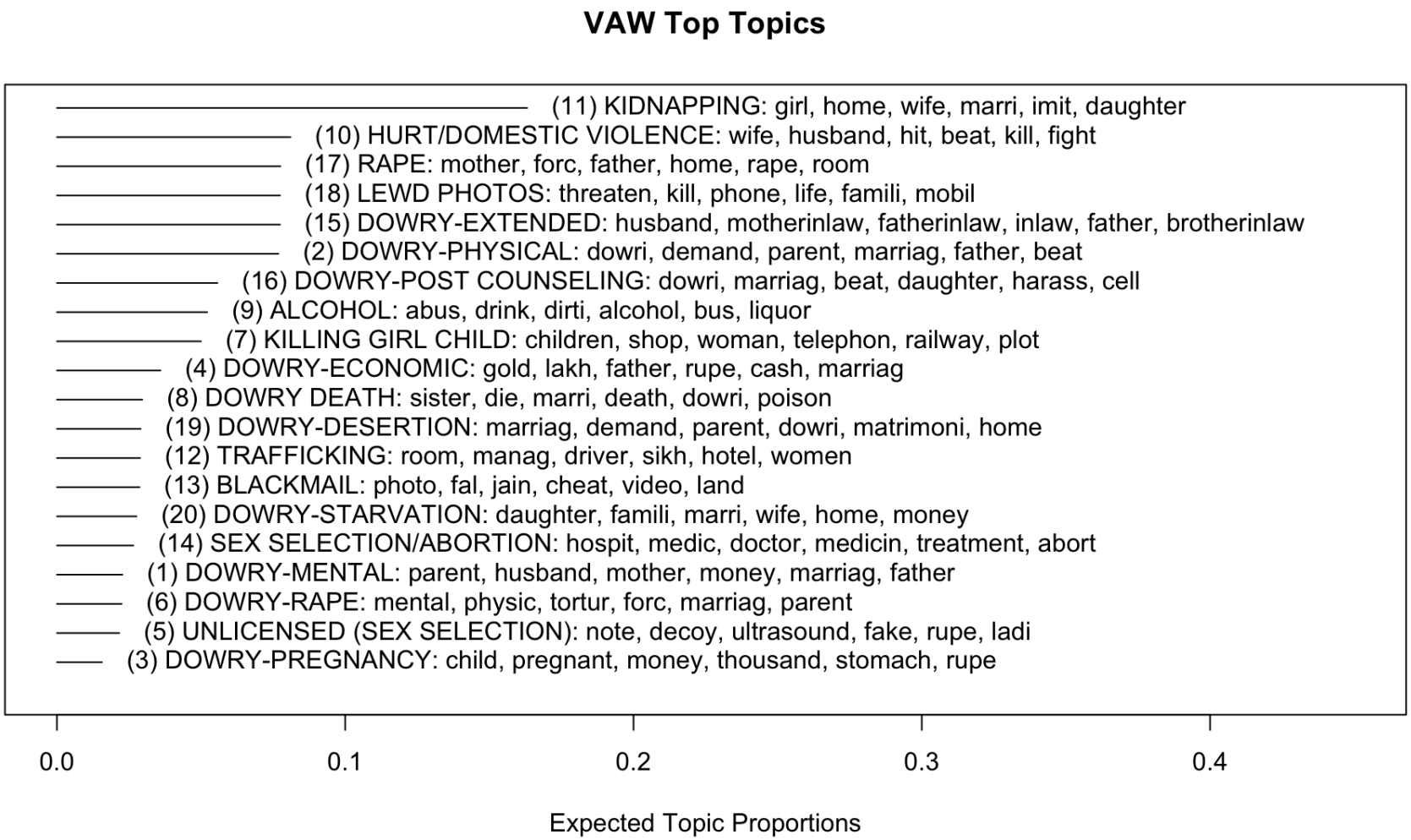
Expected Topic Proportions

Results


VAW Top Topics
(11) KIDNAPPING: girl, home, wife, marri, imit, daughter
(10) HURT/DOMESTIC VIOLENCE: wife, husband, hit, beat, kill, fight
(17) RAPE: mother, forc, father, home, rape, room
(18) LEWD PHOTOS: threaten, kill, phone, life, famili, mobil
(15) DOWRY-EXTENDED: husband, motherinlaw, fatherinlaw, inlaw, father, brotherinlaw
(2) DOWRY-PHYSICAL: dowri, demand, parent, marriag, father, beat
(16) DOWRY-POST COUNSELING: dowri, marriag, beat, daughter, harass, cell
(9) ALCOHOL: abus, drink, dirti, alcohol, bus, liquor
(7) KILLING GIRL CHILD: children, shop, woman, telephon, railway, plot
(4) DOWRY-ECONOMIC: gold, lakh, father, rupe, cash, marriag
(8) DOWRY DEATH: sister, die, marri, death, dowri, poison
(19) DOWRY-DESERTION: marriag, demand, parent, dowri, matrimoni, home
(12) TRAFFICKING: room, manag, driver, sikh, hotel, women
(13) BLACKMAIL: photo, fal, jain, cheat, video, land
(20) DOWRY-STARVATION: daughter, famili, marri, wife, home, money
(14) SEX SELECTION/ABORTION: hospit, medic, doctor, medicin, treatment, abort
(1) DOWRY-MENTAL: parent, husband, mother, money, marriag, father
(6) DOWRY-RAPE: mental, physic, tortur, forc, marriag, parent
(5) UNLICENSED (SEX SELECTION): note, decoy, ultrasound, fake, rupe, ladi
(3) DOWRY-PREGNANCY: child, pregnant, money, thousand, stomach, rupe
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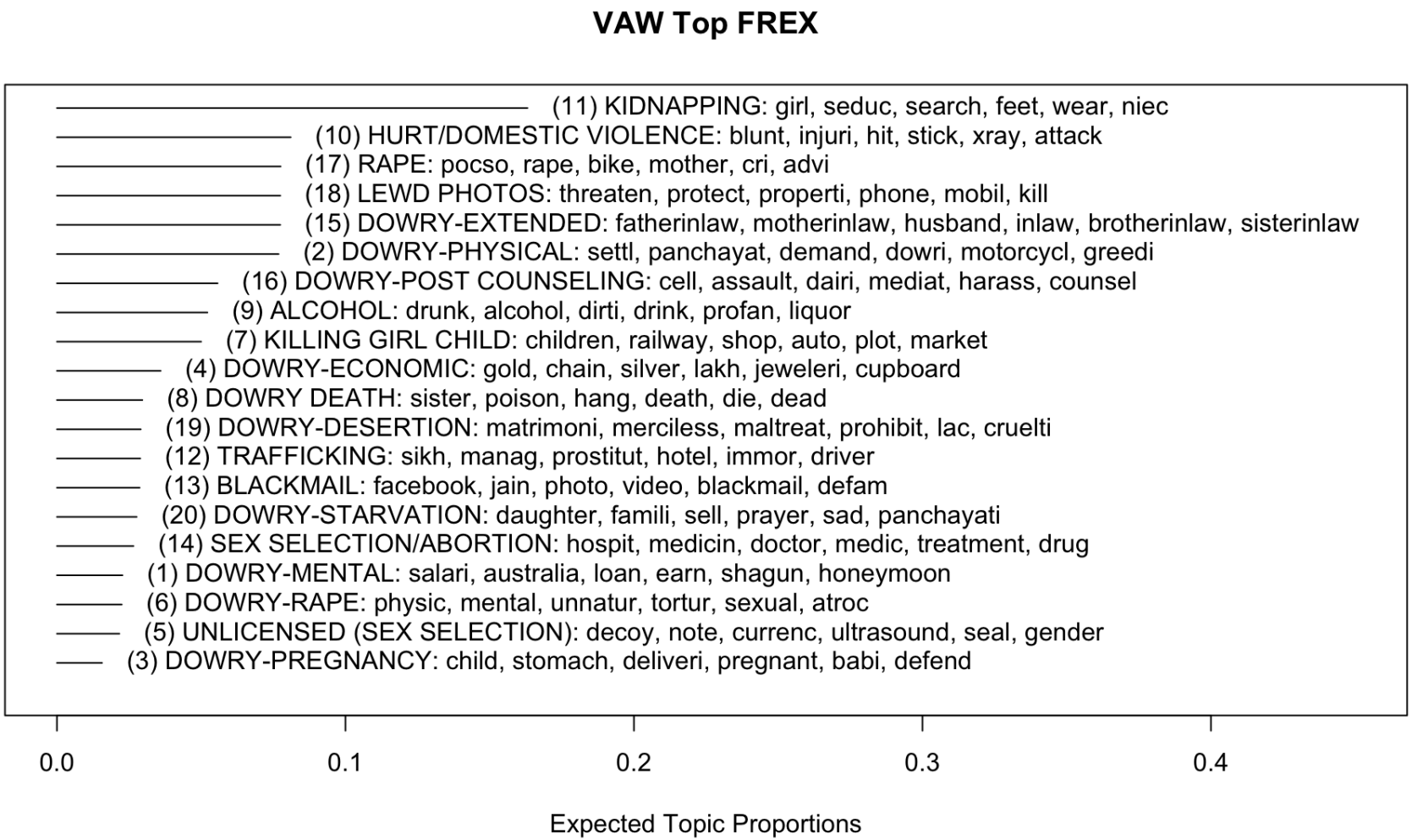
0.2
0.3
0.4
Expected Topic Proportions

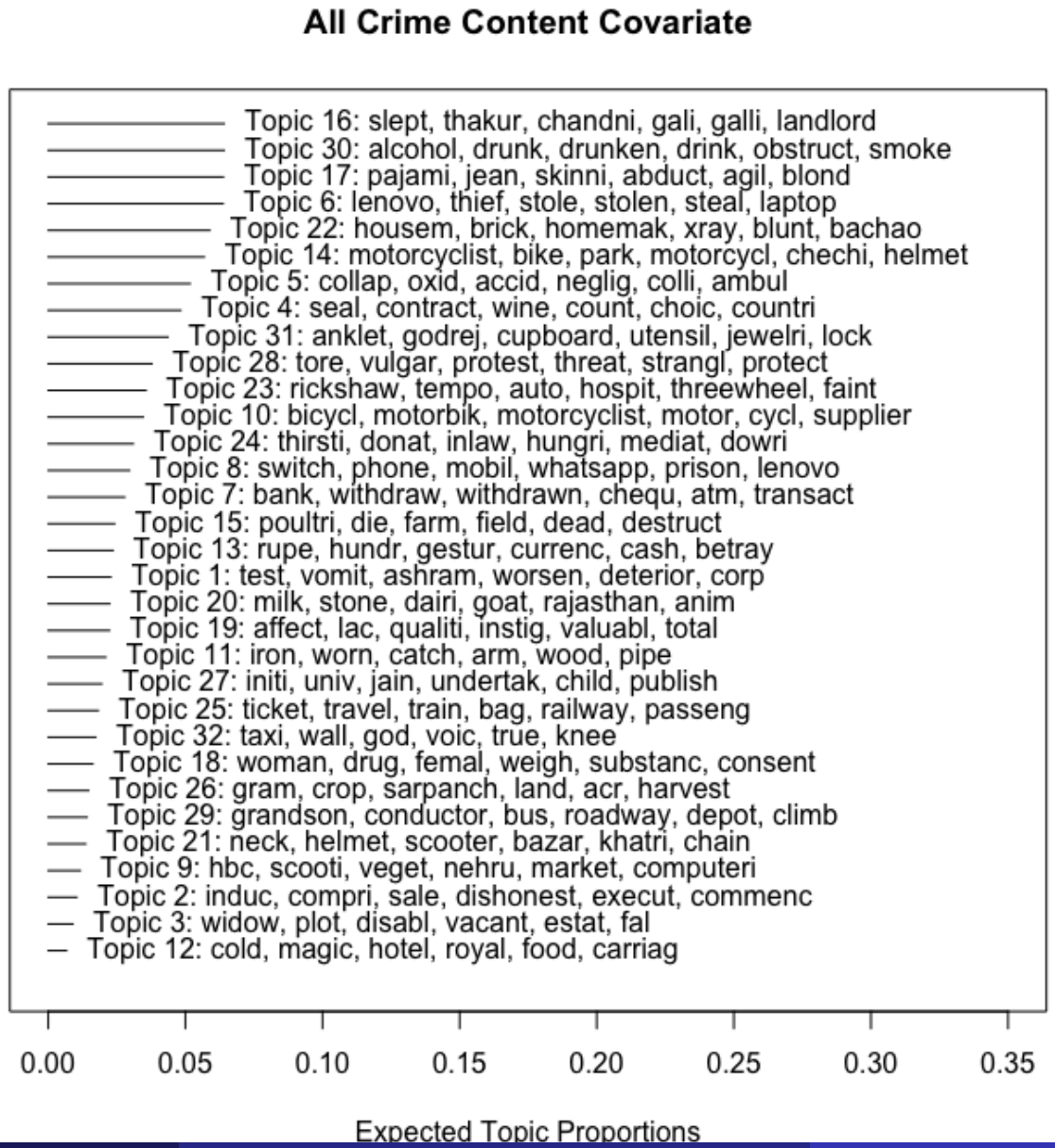
Results


VAW Top FREX
(11) KIDNAPPING: girl, seduc, search, feet, wear, niec
(10) HURT/DOMESTIC VIOLENCE: blunt, injuri, hit, stick, xray, attack
(17) RAPE: pocso, rape, bike, mother, cri, advi
(18) LEWD PHOTOS: threaten, protect, properti, phone, mobil, kill
(15) DOWRY-EXTENDED: fatherinlaw, motherinlaw, husband, inlaw, brotherinlaw, sisterinlaw
(2) DOWRY-PHYSICAL: settl, panchayat, demand, dowri, motorcycl, greedi
(16) DOWRY-POST COUNSELING: cell, assault, dairi, mediat, harass, counsel
(9) ALCOHOL: drunk, alcohol, dirti, drink, profan, liquor
(7) KILLING GIRL CHILD: children, railway, shop, auto, plot, market
(4) DOWRY-ECONOMIC: gold, chain, silver, lakh, jeweleri, cupboard
(8) DOWRY DEATH: sister, poison, hang, death, die, dead
(19) DOWRY-DESERTION: matrimoni, merciless, maltreat, prohibit, lac, cruelti
(12) TRAFFICKING: sikh, manag, prostitut, hotel, immor, driver
(13) BLACKMAIL: facebook, jain, photo, video, blackmail, defam
(20) DOWRY-STARVATION: daughter, famili, sell, prayer, sad, panchayati
(14) SEX SELECTION/ABORTION: hospit, medicin, doctor, medic, treatment, drug
(1) DOWRY-MENTAL: salari, australia, loan, earn, shagun, honeymoon
(6) DOWRY-RAPE: physic, mental, unnatur, tortur, sexual, atroc
(5) UNLICENSED (SEX SELECTION): decoy, note, currenc, ultrasound, seal, gender
(3) DOWRY-PREGNANCY: child, stomach, deliveri, pregnant, babi, defend
0.0
0.1
0.2
0.3
0.4
Expected Topic Proportions

Covariates Code

```
stm.out.c <- stm(
  out$documents,      # The processed documents
  out$vocab,          # The vocabulary of the documents
  K=K,                # Number of topics (32 in this case)
  prevalence=~female_complainant,    # Covariate affecting topic prevalence
  content=~female_complainant,       # Covariate affecting topic content
  data=out$meta,      # Metadata associated with the documents
  max.em.its=25,      # Maximum number of EM (Expectation-Maximization) iterations
  seed=1033311        # Random seed for reproducibility
)
```

Results


All Crime Content Covariate
Topic 16: slept, thakur, chandni, gali, galli, landlord
Topic 30: alcohol, drunk, drunken, drink, obstruct, smoke
Topic 17: pajami, jean, skinni, abduct, agil, blond
Topic 6: lenovo, thief, stole, stolen, steal, laptop
Topic 22: housem, brick, homemak, xray, blunt, bachao
Topic 14: motorcyclist, bike, park, motorcycl, chechi, helmet
Topic 5: collap, oxid, accid, neglig, colli, ambul
Topic 4: seal, contract, wine, count, choic, countri
Topic 31: anklet, godrej, cupboard, utensil, jewelri, lock
Topic 28: tore, vulgar, protest, threat, strangl, protect
Topic 23: rickshaw, tempo, auto, hospit, threewheel, faint
Topic 10: bicycl, motorbik, motorcyclist, motor, cycl, supplier
Topic 24: thirsti, donat, inlaw, hungri, mediat, dowri
Topic 8: switch, phone, mobil, whatsapp, prison, lenovo
Topic 7: bank, withdraw, withdrawn, chequ, atm, transact
Topic 15: poultri, die, farm, field, dead, destruct
Topic 13: rupe, hundr, gestur, currenc, cash, betray
Topic 1: test, vomit, ashram, worsen, deterior, corp
Topic 20: milk, stone, dairi, goat, rajasthan, anim
Topic 19: affect, lac, qualiti, instig, valuabl, total
Topic 11: iron, worn, catch, arm, wood, pipe
Topic 27: initi, univ, jain, undertak, child, publish
Topic 25: ticket, travel, train, bag, railway, passeng
Topic 32: taxi, wall, god, voic, true, knee
Topic 18: woman, drug, femal, weigh, substanc, consent
Topic 26: gram, crop, sarpanch, land, acr, harvest
Topic 29: grandson, conductor, bus, roadway, depot, climb
Topic 21: neck, helmet, scooter, bazar, khatri, chain
Topic 9: hbc, scooti, veget, nehru, market, computeri
Topic 2: induc, compri, sale, dishonest, execut, commenc
Topic 3: widow, plot, disabl, vacant, estat, fal
Topic 12: cold, magic, hotel, royal, food, carriag
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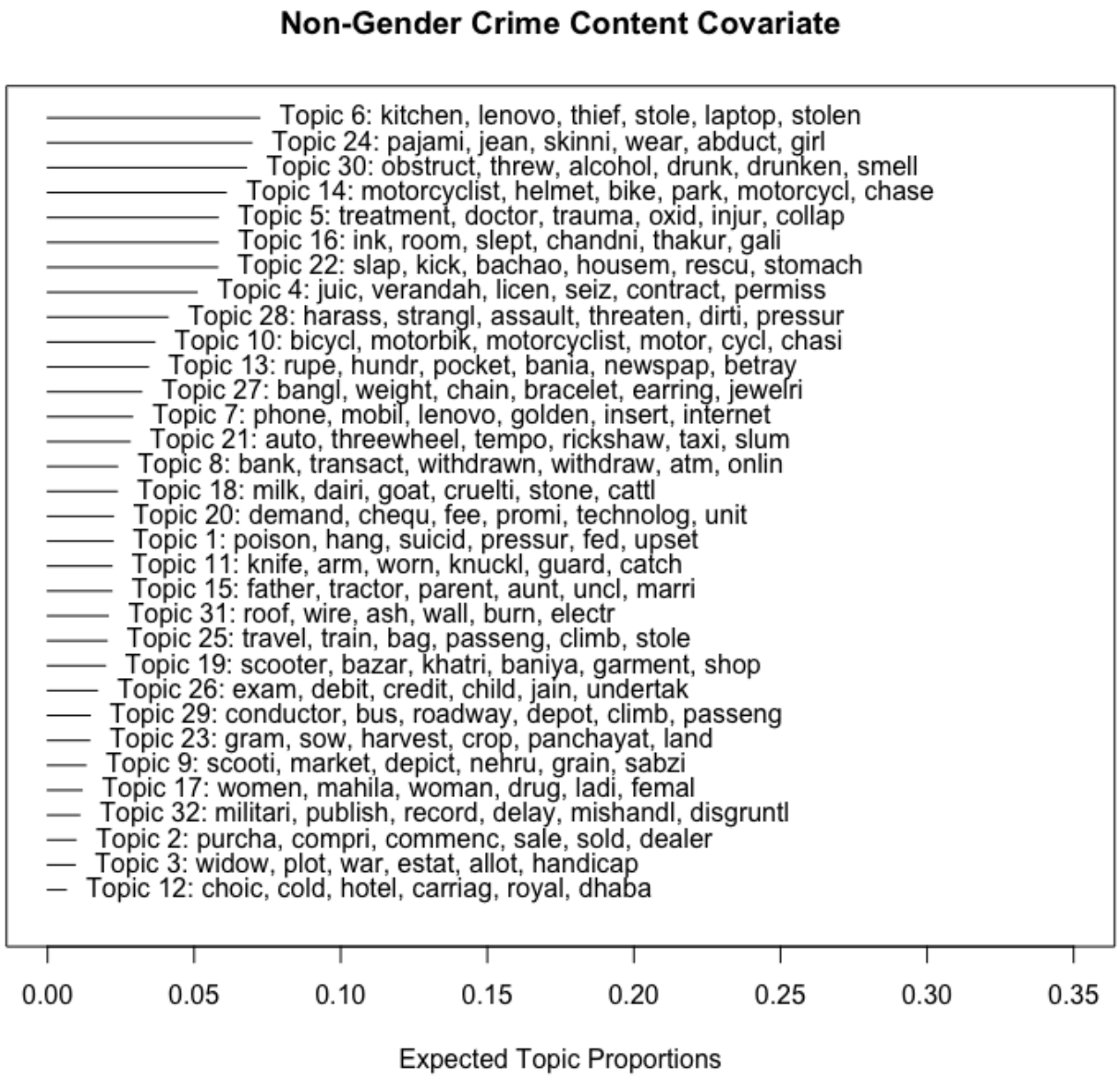
0.30
0.35
Expected Topic Proportions

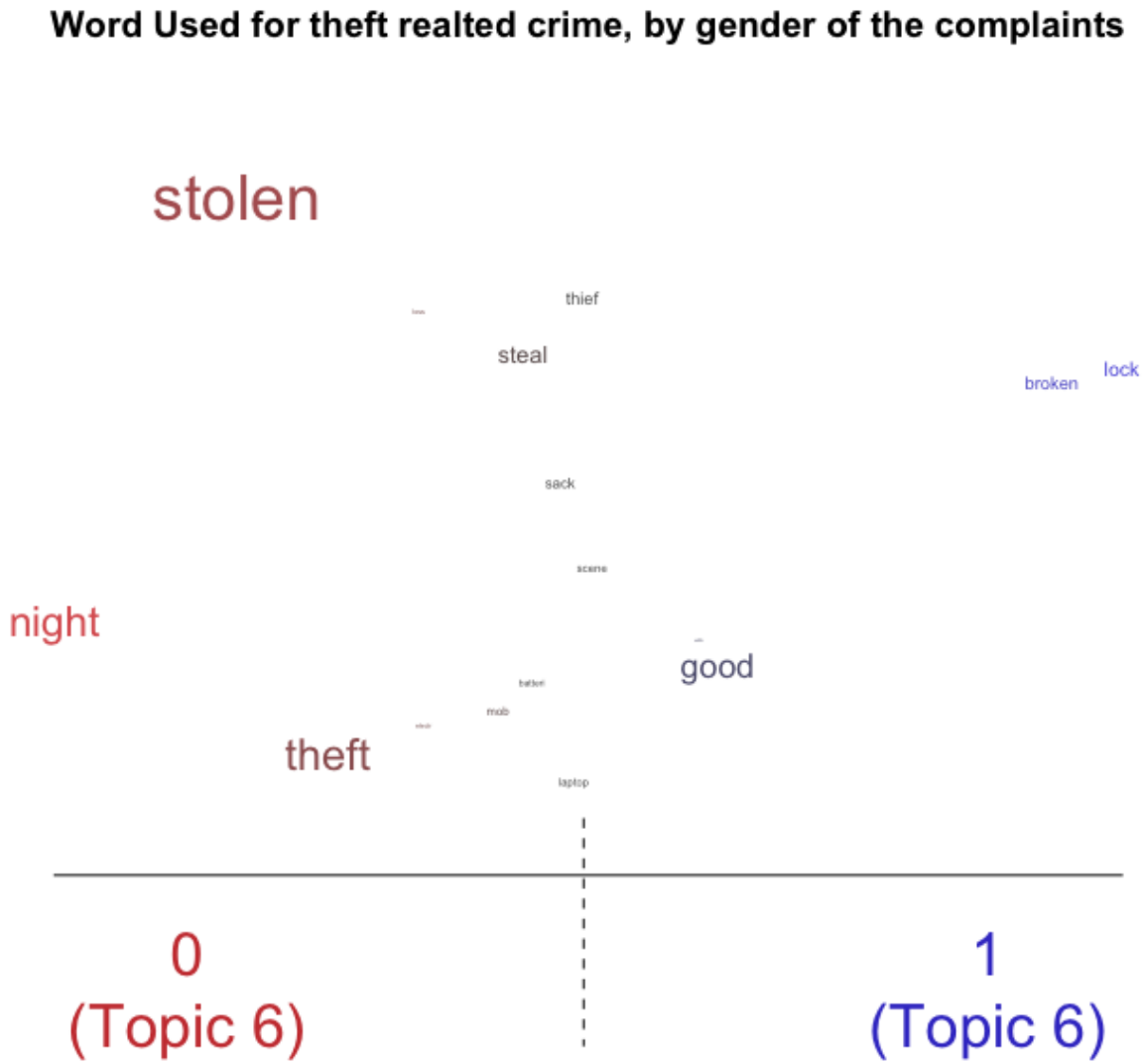
Results


Non-Gender Crime Content Covariate
Topic 6: kitchen, lenovo, thief, stole, laptop, stolen
Topic 24: pajami, jean, skinni, wear, abduct, girl
Topic 30: obstruct, threw, alcohol, drunk, drunken, smell
Topic 14: motorcyclist, helmet, bike, park, motorcycl, chase
Topic 5: treatment, doctor, trauma, oxid, injur, collap
Topic 16: ink, room, slept, chandni, thakur, gali
Topic 22: slap, kick, bachao, housem, rescu, stomach
Topic 4: juic, verandah, licen, seiz, contract, permiss
Topic 28: harass, strangl, assault, threaten, dirti, pressur
Topic 10: bicycl, motorbik, motorcyclist, motor, cycl, chasi
Topic 13: rupe, hundr, pocket, bania, newspap, betray
Topic 27: bangl, weight, chain, bracelet, earring, jewelri
Topic 7: phone, mobil, lenovo, golden, insert, internet
Topic 21: auto, threewheel, tempo, rickshaw, taxi, slum
Topic 8: bank, transact, withdrawn, withdraw, atm, onlin
Topic 18: milk, dairi, goat, cruelti, stone, cattl
Topic 20: demand, chequ, fee, promi, technolog, unit
Topic 1: poison, hang, suicid, pressur, fed, upset
Topic 11: knife, arm, worn, knuckl, guard, catch
Topic 15: father, tractor, parent, aunt, uncl, marri
Topic 31: roof, wire, ash, wall, burn, electr
Topic 25: travel, train, bag, passeng, climb, stole
Topic 19: scooter, bazar, khatri, baniya, garment, shop
Topic 26: exam, debit, credit, child, jain, undertak
Topic 29: conductor, bus, roadway, depot, climb, passeng
Topic 23: gram, sow, harvest, crop, panchayat, land
Topic 9: scooti, market, depict, nehru, grain, sabzi
Topic 17: women, mahila, woman, drug, ladi, femal
Topic 32: militari, publish, record, delay, mishandl, disgruntl
Topic 2: purcha, compri, commenc, sale, sold, dealer
Topic 3: widow, plot, war, estat, allot, handicap
Topic 12: choic, cold, hotel, carriag, royal, dhaba
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Expected Topic Proportions

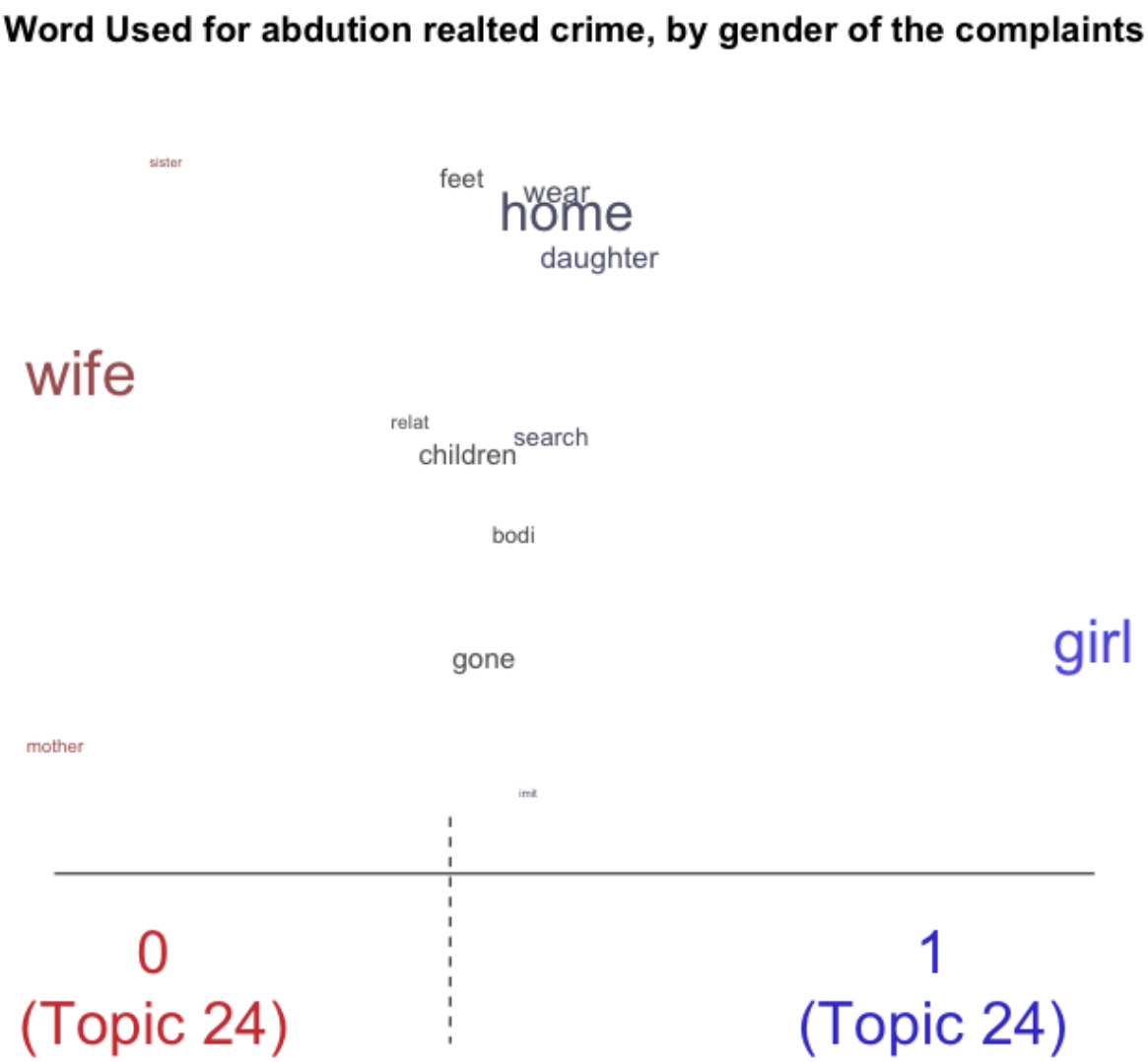
Extensions

- We analyze the most frequently used words by men and women within the same topic in police reports.
- Rationale: Do men and women use certain words differently or with varying frequency when reporting a criminal case?
- For example, in alcohol-related incidents, what words are predominantly used by men, and which ones are more common among women?
- We perform this exercise in three topics in non-gendered police reports

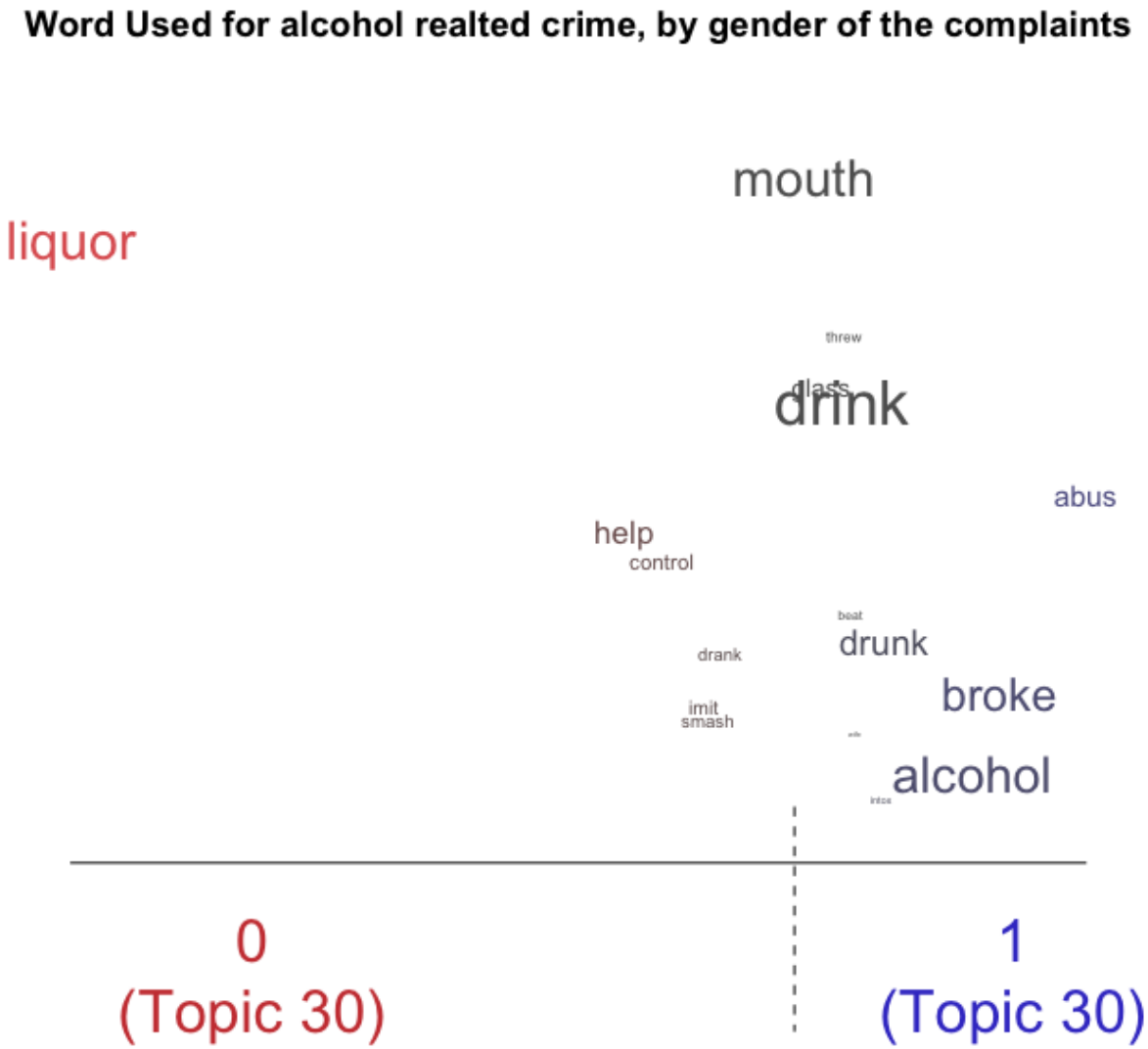
Extensions Results



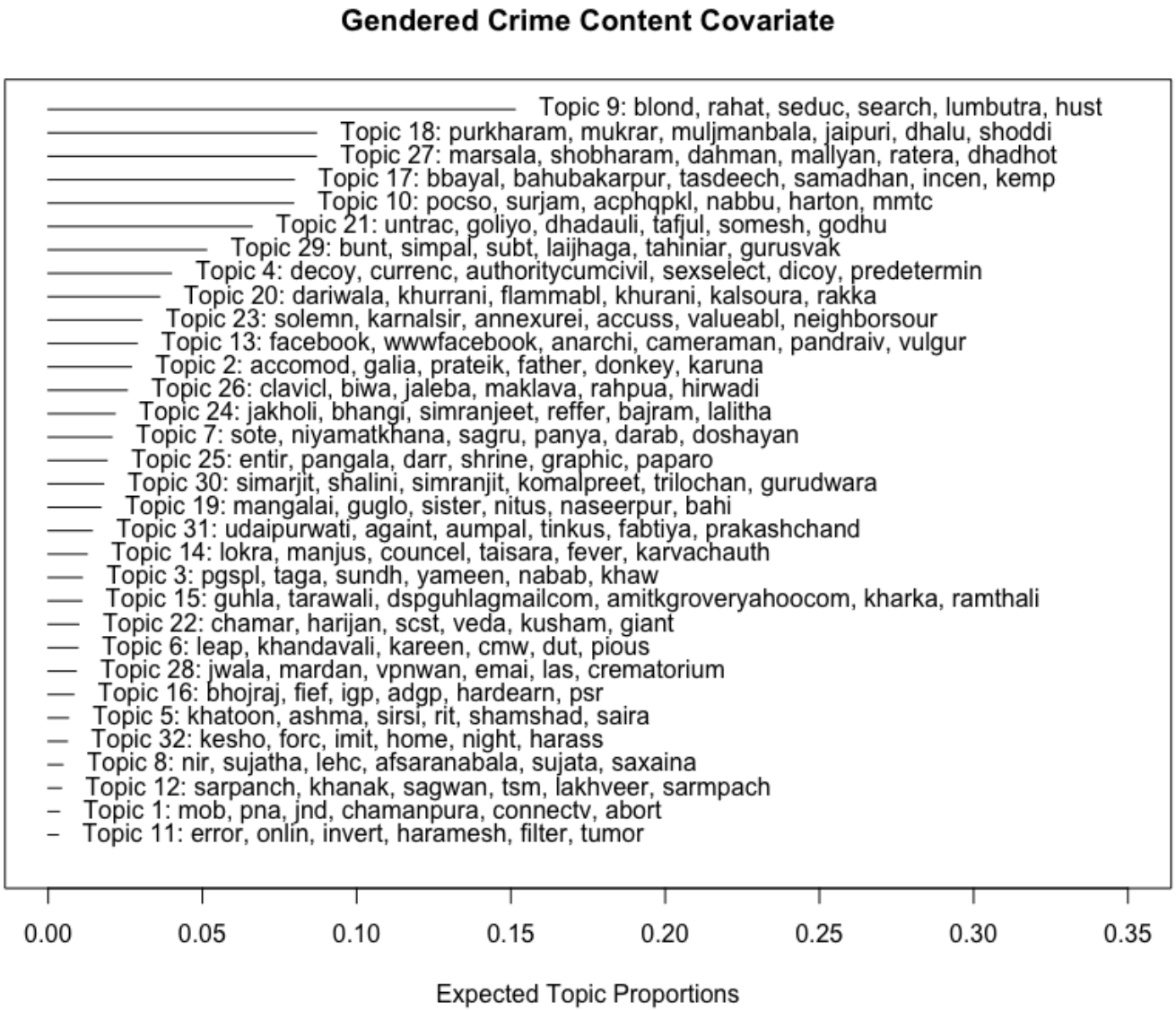
Extensions Results



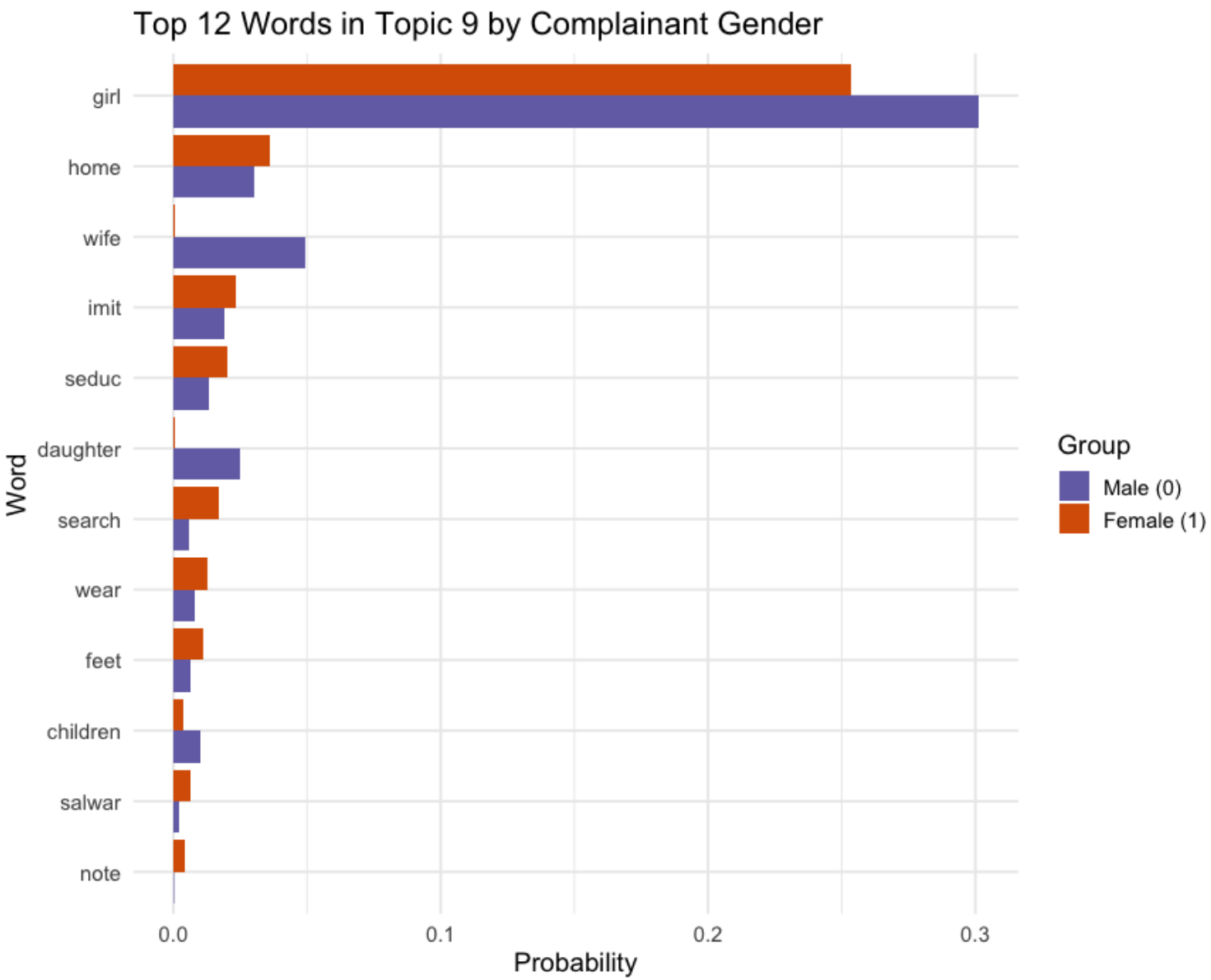
Extensions Results



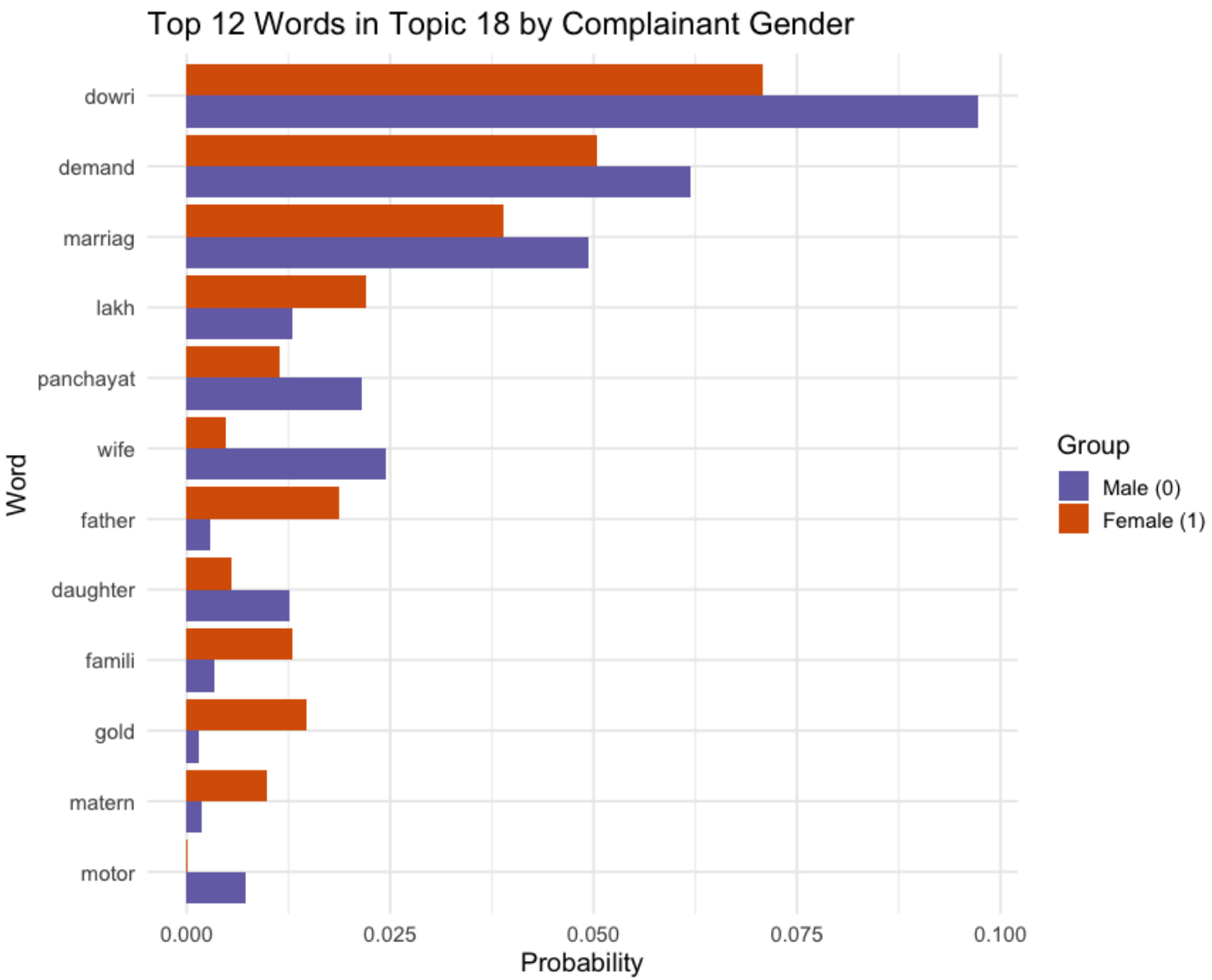
Extensions Results



Extensions Results



Extensions Results



Autopsy

- Overall, finding a paper with well-documented replication materials was challenging
- We are highly satisfied with our STM results. It was also valuable to deepen our understanding of STMs and FREX
- We included the STM for all types of crimes, an analysis presented in the author's code but not in the paper
- All STM results were successfully replicated, producing identical outcomes since we used the same seed
- Our extensions were straightforward to implement and provided valuable insights

Suggested Improvements

- It is unclear how and where the translation from Hindi to English occurs in the author's code
- The gendered crime corpus was not translated, which makes challenging to easily interpret results