f¸gKv
Introduction

Z_¨‡K Avgiv msL¨v w`‡q c‡Kvk Kwi| wKš‘ msL¨v ïa¸¨Î msL¨v bq| GB msL¨v¸‡jv cwimsL¨b Gbwg‡te Dcw¯'Z nq GKwU we‡kI †c¶¶vc‡U wewfbæc‡Ôc‡‡Âi ijc, cKwZ. I m¤ú†KP eYÖv Ges e¨vL¨v gva¨g Gbwg‡te| cwimsL¨b kãwUi mv‡_ h¸wiv cwiwPZ bb Zw‡`i Kv‡Q kãwU GKwU `‡e‡Ía¨ c`| wKš¨huiv cwiwPZ Zviv‡i Gi wewfbæA_©I e¨vL¨v K‡i _v‡Kb| d‡j, cwimsL¨v‡bi e¨envi wb‡tq cwÛZ‡`i g‡ta¨ we‡Z‡KP D™‡ N‡U‡U| GK¨‡j g‡tb K‡ib †h, Avgv‡`i ˆ`bw›`b Rxe‡bi cñZwi‡U cwimsL¨v‡bi c‡Fve Acwimxg Ges Gi e‡envi Acwinvh©¨ Ab¨‡j g‡tb K‡ib †h, cwimsL¨v‡bi hZUKz¸ i¶Z¡†`qv DuPr mvgwiRK we¨ªZ‡b Zvi †P‡tq †ekx ¸i¶Z¡†`qv n‡tq‡Q th, ¸YMZ mvgwiRK c‡c‡tÂi we‡tkl‡tY cwimsL¨v‡bi Avt¯Š †Kvb c‡‡iqvRb i‡tqq‡Q wK? G me we‡Z‡KP Ašivbë‡bZ A_© Ab‡ty‡e‡tbi j‡t¶¨ Avgv‡`i cwimsL¨v‡bi c‡KvZ. msÁv. ¸i¶Z‡¸i¶¨v e¨envi I mxgve×Zv m¤ú†úK© Rvbv c‡‡iqvRb| GB BDwb‡tU G mKj welq wb‡tqB wek``fv‡te Av‡tjvPbv Kiv n‡tq‡Q|

GB BDwb‡tU Avgiv m¨bv`¯‡Fv‡te †h cvV¸ ‡tj¨v Aa¨bqb Ki‡tev †m¸‡tj¨v n‡tj¨v:

♦ cvV - 1 : cwimsL¨b wK Ges †Kb Zv Avgiv Aa¨qb Kwi?

♦ cvV - 2 : cwimsL¨v‡bi Kvh†®ejx – weeiI I Ab‡gwb

♦ cvV - 3 : mvgwiRK M‡teIvq cwimsL¨v‡bi ¯ib

♦ cvV - 4 : cwimsL¨v‡bi wK0y†gšwj K c‡Ž¨q

cwimsL¨ïb ïK Ges †Kb Zv Avgiv Aa¨qb Kwi?
Statistics: What are They and Why We Study Them?

G cW †k‡I hv Rvbv h‡te —

- *cwimsL¨ïb Aa¨q‡bi ¸iæZ¡*
- *cwimsL¨‡bi cÖKuZ. I msÁv*
- *cwimsL¨‡bi m¨gve×Zv*

cwimsL¨ïb Aa¨q‡bi ¸iæZ¡ (Importance of Studying Statistics)

cwimsL¨‡bi cÖKuZ. I msÁv (Nature and Definition of Statistics)

weeiYgj-K cwimsL¨b msL¨ïZwĚK Dcv‡Ëi msMĥ I msw¶ßKiY ub‡q Av‡jvPbv K‡i| G ai‡Yi cwimsL¨b Avgv‡`i ``bw`b e¨env‡ii Ask hv cÖZw`‡bi Av‡jvPbv I msev` n‡q Avgv‡`i m¤§ĝL Dc¯wcZ nq| GKwU D`vniY w`‡q welqwU m¤út K©Av‡iv cwim®vi aviYv ‡bqv hvK| thgb, evsjv‡`‡k eZ§ĝwb cĝ 14 ‡KwU RbmsL¨v i‡q‡0, Gi g‡a¨ 51 kZvsk cyĝI 49 kZvsk bvix| GB cwimsL¨bwUi gva¨‡g Avgiv evsjv‡`‡ki wj½wfwĚK RbmsL¨vi GKwU weeiY cvB, hv Av`¨giwixi gva¨‡g msM¨pxZ I msw¶ß AvKv‡i GKwU mviwY‡Z Dc¯wcZ nq|

cwimsL¨bMZ c×wZ wewfbŽMwwYwZK mĭ¯e¨env‡ii gva¨‡g DcvË we‡kdl‡Yi wewfb‡KŠkj ub‡q Av‡jvPbv K‡i| thgb, bgĝyqb, Abĝ¨í cix¶Y, Awf‡¶cY, mvaviYxKiY, BZ¨¨i †¶‡Î e¨eüZ ‡KŠkjmgn| cwimsL¨b c×wZi †KŠkj ¸‡jv cÖqvwMi w¨K ‡_‡K wKQ¨v RwUj n‡jI G¸‡jv m¤út K©mvaviY cvV‡Kiv wKQ¨v aviYv mn‡RB ub‡Z cv¨ib| cwUMwwYZ I exRMwwY‡Zi wKQ¨y¢¨ugK c×wZ (thgb, eM§ĝj- Kiv, eM©Kiv, GKwU AÁvZ gv‡bi Rb¨ exRMwwYwZK mgvKi‡Yi gva¨‡g mgvavb Ki‡Z Rvbv, BZ¨¨) Rvbv _vK‡j cÖqvwMK cwimsL¨‡bi MwwYwZK welq¸‡jv ub‡q mgm¨v nevi K¸v bq| me‡P‡q ¸iæ€pY©th welq¸‡jv G †¶‡Î Rvbv cÖqvRb Zv n‡jv cwimsL¨‡bi mwWK e¨vL¨v Ges e¨envi| ‡Kbbv, cwimsL¨‡bi Kw¨šĦi MYbv I wnmve AvRKvj kw¨³kvjx K¨vjK¨j‡Ui Ges K¤¨úDU‡ii gva¨‡g L¨ mn‡RB K‡i †dj¨v hvq| Ab¨ K_vq ej¨v hvq †h, hw` K¨vjK¨j‡Ui I K¤¨úDUvi-Gi gva¨‡g mn‡RB Ges `¤ZZvi mv‡_ cwimsL¨‡bi MYbv, wnmve I ubY§Ĝ Kiv hvq Z‡e †m¸‡jv nv‡Z ubY§Ĝqi cÖPór †Zgb †Kvb K¨‡ZZ¨i welq bq| i¨aythUĝKÿ‡evSv cÖqvRb Zv ub‡jv wKfv‡e GKwU cwimsL¨‡bi Rb¥n‡"Q Zvi hy²wU| cwimsL¨b n‡jv c¨iv MĭÜUi GKwU †QvÜU Ask gvĵ| GKwU cwimsL¨b †Kvb A_©enb Ki‡e bv hw` Gi mwWK e¨vL¨v bv Kiv hvq| Avi cwimsL¨‡bi mwWK ubY§Ĝ KLĝbvB h¨vh¨_e¨vL¨‡K ubÖðZ K‡i bv|

Z_Ĝ msMĥ I webȨ¨tmi Rb¨ cwimsL¨‡bi Bs‡iRx Statistics kãwU c¨̈g e¨eüZ nq AóÝ`k kZ‡K| Z‡e Z_Ĝ msMĥni KvR Gi eü ce©ĝ‡_KB ivófq cÖqvR‡tb cKvwmK‡i`i Ki‡Z n‡q‡0| G mKj cÖPib Z_Ĝ msMĥ I Gi webȨ¨tmi D‡`wM¸jv wUqj ¯j- Ges we‡kI gb¨‡tZ† cÖqvR‡tb ‡gUv‡tbvi Rb¨| mß`k I AóÝ`k kZ‡K cwimsL¨bMZ Z_Ĝ msMĥni ifcwU e`¨jv Ges Gi e¨cKZvI ev‡o| RbmsL¨vi AvKvi I m¤út`i cwigvY Qvov¤I Rb¥, g¨Zĝ I weevn m¤úwK²† Dcv˨ msMĥxZ n‡Z _v‡K| e¨ycwĚMZ w¨K ‡_‡K Gi DrcwË nq GKwU BZvjxq kã 'Statistica' ‡_‡K| 1801 m‡t`i Bsj¨vĚi c¨̈g Av`¨giwixwcUB msMĥxZ Dcv‡ËI weĝfbgĝjx we‡kdlY‡K Acwiwvh©K‡i †Zv‡j| mĝó nq Dcv‡Ëi cwimsL¨bMZ we‡kdl‡Yi wewfbœc×wZ I †KŠkj|

cwimsL¨b kãwU‡K mvaviYYf¨‡t `ĝU At_©e¨envi Kiv nq _v‡K| c¨̈gZt, GKwU eüePbMZ we‡kI¨ unmv‡te| A_fÑr, msL¨ïZwĚK Z_Ĝ, thgb, GKwU RbmsL¨vi AvKvi, Gi Rb¥I g¨Zÿ¨ cwigvY, BZ¨¨i |w¤ZxqZt, GKwU GKePbMZ we‡kI¨ unmv‡te| A_fÑr, Z_Ĝ msMĥ I we‡kdl‡Yi c×w¨Z¸jv‡tK †evSvtZ GKePbMZ we‡kI¨wUK e¨envi Kiv nq _v‡K| Av‡iv mnRfv‡te ejv hv‡q th, weÁv‡tbi GKwU kvLv unmv‡te cwimsL¨b hLb †Kvb welqi Dci Z_Ĝ msMĥ, we‡kdlY I Dc¯vc‡tbi c×wZ ub‡t Ř K‡i ZLb GKePb At_©cwimsL¨b‡K msÁvwqZ Kiv nq _v‡K| Avi hLb cwimsL¨b ej‡tZ we‡kI c×w¨Z‡Z msMĥpxZ †Kvb Z_Ĝiwk‡tK †evSvtq ZLb eüePb At_© cwimsL¨b‡tK wPwŕŽ Kiv nq _v‡K| mvaviY gvb¨ly msMĥpxZ Z_Ĝejx m¤út K²† Rvb‡tZ †ekx Av¨Mĥx, msMĥ I Dc¯vc‡tbi c×wZ m¤út K©bq|

th †Kvb At_ŰB e¨envi Kiv nq _vKĮK bv †Kb GwU ¸i‡tZ¨i mv‡_ g‡tb ivLv cÖqvRb th, cwimsL¨b Z‡t¨i msL¨mPK i¨tci cÖKvk wb‡tqB Av‡jvPbv K‡i| cwimsL¨b msL¨ GK‡tKi gva¨‡g cĝwkZ nq| G mKj GKK n‡tZ cv‡ti Uv‡Kv, eQi, BwÂ, BZ¨¨wb| Z‡t MĝYZkv¨‡t¸

msL¨ïtK msL¨welqK c×uZi
gva¨tg cwimsL¨tb cwiYZ
KivB ntjv cwimsL¨tbi
Aa¨qb|

wewfbœkvLvi gZ msL¨ïtK ïagyvÎ msL¨v unmvteB wetePbv Kiv nq bv| cwimsL¨vb msL¨v ubfl°
ntjI GwU GK¸"Q Z_¨tK msw¶ß Kiv, wetkdlY Kiv ev gj-¨vqb Kivi KvtR e¨envi Kiv thtZ
cvti| thgb, Avcbvi G eQtii GPA (Grade Point Average) GKwU msL¨v| GB msL¨wWUtK
Avcbvi cix¶vq KZKvh©Zvi mvi-mst¶c unmvte e¨envi Kiv thtZ cvti| GwUtK Avcbvi
axkw³i gj-¨vqb unmvte e¨envi Kiv thtZ cvti| MZ eQtii djvdtji mvt_ Zzbvq e¨envi
Kiv thtZ cvti| GgbwK Avcbvi AMÖMwZi wetkdlY e¨envi Kiv thtZ cvti| G mKj
msL¨ïtK msL¨welqK c×uZi gva¨tg cwimsL¨tb cwiYZ KivB ntjv cwimsL¨tbi Aa¨qb|

cwimsL¨tbi `ŵU weÁvbm¤§Z A_©ïtqtQ| c‗gZt, GKwU ubw`ó weÁvb ev ewgxweÉK tckvi
t¶Î unmvte; Ges wØZxqt, cwimsL¨vbMZ bgwyi thŵ³K weeiY unmvte| GB `ŵU welqtK
gtb ïitL ejv hvq th, cwimsL¨vb ntjv DcvË msMÖn, mywse×KiY, msw¶ßKiY, Dc¯vcb,
wetkdlY Ges D³ wetkdlYi wfwËtZ h_vh_ Dcmsnvi cŸqb I thŵ³K um×všÍ Möthi
^eÁwbK c×uZmgtüni ubqge× cvV|

cwimsL¨tbi mxgve×Zv (Limitations of Statistics)

GKwU cwimsL¨vb weÁvbm¤§Zfvte muWK ntjI Zv ev¯eZvi fjy wPÎ cŗvb KitZ cvti ev fjy
Dcmsnvti tcŴtZ cŸweeZ KitZ cvti| cŴxb cŵPbwU Gt¶tÎ ¯§iYxq — 'figures don't
lie, but liers can figure'| GB cvtVi AvtjvPbv mgvß Kivi cte©wKQymZK®vYx gtb ivLv
cŴqvRb — cŗgZt, cwimsL¨vb Ggb tKvb c×uZ bq hvi gva¨tg GKRb hv Lyk Zv cŵqY
KitZ cvtib| cwimsL¨vbMZ c×uZmgtüni tfZti Ggb tKvb mnRvZ e¨e¯v tbB hvi gva¨tg
GKRb Amr MtelK¸tK DcvË t_tK Zui ubtRi gZ Kti Dcmsnvi Uvbvi t_tK weiZ ivLv thtZ
cvti| wØZygZt, cwimsL¨vb tKejgvÎ Zt_¨i mgwnvi bq| hw¯ ZvB ntZv, Zte GB weltqi
we¯ŵiZ Aa¨qtbi cŴqvRb ntZv bv| ZZxqgZt, cwimsL¨vb tKvb wegZ©ZweÉK wPŴlvi ev
e¨wZµgagx®welqe¯i mywPŵlvi ubix¶vi weKí bq| cwimsL¨vbMZ c×uZmgtüni mvt_ tKm
ówWi ¸YMZ wetkdlYi tKvb we¯ivta tbB, eis `ŷUv `ŷóf½x GtK Act¨i cwici-K| PZz_§t,
cwimsL¨vb cwigvc c×uZ ev cŴKgyjv ev DcvË msMÖni Ab¨vb¨ gva¨g¸tjvivI weKí bq|

mviwsk

hZw`b aÍi Avgiv Avgvt`i fvLv e¨envi Kti AvmuQ ZZw`b atiB Avgiv tKvb bv tKvb fvte
cwimsL¨tbi e¨envi Kti AvmuQ| Avgvt`i Kt_vcK_tbi g¨a¨g Avgiv cŴiz e³e¨ Dc¯vcb
Kwi hv cŴwZMZfvte cwimsL¨vbmK| cŴZw`b miKvix cwiKíbvq, weÁvb I cŵyÎ¨tZ Ges wkí
KviLvbvq th mKj cwimsL¨vb e¨enüZ nq tm¸tjv Avgvt`i RavebhÎvq miwmwi cŕve tdtj|
cwimsL¨vb kãuWUK mviweYfvte `ŷU At_© e¨envi Kiv ntq _vtK| cŗgZt, GKwU eûePbMZ
wetkl¨ unmvte| wØZxqt, GKwU GKePbMZ wetkl¨ unmvte| th tKvb At_¨ e¨envi Kiv ntq
vKK bv tKb GwU ¸iai‡Zi mvt gtb ivLv cŴqvRb th, cwimsL¨vb Zt_¨i msL¨vmPK iÍci
cŔvk‡K ubtqB AvtjvPbv Kti| cwimsL¨vb msL¨v GKŧKi gva¨tg cŴwkZ ntjI MwŸYZKvt¨zi‡
wewfbœkvLvi gZ msL¨ïtK ïagyvÎ msL¨v unmvteB wetePbv Kiv nq bv|

cv‡V¨Ë*i gj-¨vqb

ˆbe¶³K c‹Ëœ

mwVK Dˉ‡ii cv‡k wUK (√) wP‹ý w`b –

1| Statistics kã‹U c‹ˉ_g e¨eüZ nq:
   K. †Iwj kZ‡K
   L. mß`k kZ‡K
   M. Aóv`k kZ‡K
   N. Ebwesk kZ‡K

2| cwimsL¨vb k‡ãi Drcwˉ GKwU .... kã †_‡K|
   K. divmx
   L. BUvjxq
   M. Rvgˉb
   N. wne‡a

3| cwimsL¨vb msL¨v:
   K. kõgwÎ msL¨vi gva¨‡g c‹Kwk kZ nq
   L. eYˉvi gva¨‡g c‹Kwk kZ nq
   M. e¨vL¨v wnmv‡te we‡ewPZ nq
   N. GK‡Ki gva¨‡g c‹Kwk kZ nq

msw¶ß c‹Ëœ

1| cwimsL¨vb we•Áv‡bi Drcwˉ Av‡jvPbv Ki‡b|

2| mgvR e¨vL¨vq cwimsL¨v‡bi e¨envi Av‡jvPbv Ki‡b|

iPbvgj-K c‹Ëœ

1| cwimsL¨vb Aa¨vq‡bi c‹qvRbxqZv Av‡jvPbv Ki‡b|

2| cwimsL¨v‡bi msÁv w`b I Gi c‹KwZ Av‡jvPbv Ki‡b|

<div style="text-align:right">

cW - 2

</div>

cwimsL¨¢bi Kvhv©jx: veeiY I Abyvb
Functions of Statistics: Description & Inference

G cW †k‡I hv Rvbv hv‡e —

- *cwimsL¨¢bi j¶¨ I D‡Ïk¨*
- *cwimsL¨¢bi Kvhv©jx*

cwimsL¨¢bi j¶¨ (Objectives of Statistics)

cwimsL¨b weKv‡ki BuZnvm ch©‡jvPbv Ki‡j †`Lv hvq †h, cwimsL¨b PP©n KZK¸ jv j¶¨ ev D‡Ïk¨ i‡q‡Q| †m¸ jv v n‡jv:

GK.   Z_¨iwk‡K GKwU mybyw`© msL¨mPK Dcv‡Ë Dc¯vcb Kiv| thgb, ÔmˡŠyii U‡b$Wv‡Z mvgyÿK R‡jv"Qytm A‡bK gvbly nZwnZ n‡qt0Ô e³e¨Ui cwietZ©‡i 1970 m‡bi U‡b$W¨ I mvgyÿK R‡jv"Qytm c¶q 20,000 gvbly nZvnZ n‡qt0Ô e³e¨U AvaKZi m² I mybyw`© Z_¨C¤vb K‡i |

`y.     e¸r AvKv‡ii Z_¨iwk‡K mijxKiY I †kÿxe× Kiv| thgb, Av`gÿg¨vbi gva‡tg msM¥y¡Z wekvj Z_¨iwki Zvrch©e@§‡Z n‡j †m¸ jv‡K †kÿxe× K‡i ubtq Zvici we‡k∥Y Ki‡Z nq|

wZb.   Z¸bvgj-K we‡kÛ‡Yi c×wZ miei‡n Kiv| GKwU Z_¨gv‡ei AšÍb©¯ A_©®e@§‡Z n‡j GKB iKg Av‡tiKwU Z_¨gv‡ei mv‡_ Z¸bvi Kiv c§qvRb| GB Z¸bvi Rb¨ Dchy¢ c×wZ ubt`Ò Kiv cwimsL¨¢bi Ab¨Zg j¶¨|

Pvi.   bwuZ wbafi¨tY miKvi, cKvivb, wkÍ cwiPvjK, I bwuZ wbafiK‡`i mnvqZv Kiv| thgb, GKwU †`‡ki RbmsL¨vi AbyvtZ wK cwigvY we¯vjq q, nvmcvZvj, †hvMv‡hvM e¨e³v, BZ¨w`i c¤qvRb Zv Rvbv AZ¨vek¨K| cwimsL¨¢bi Ab¨Zg D‡Ïk¨ n‡jv G mKj Z_¨ mieivn Kiv|

cuP.   bwuZ wbafiY I fuel¨r Kg©šv c⁄ytbi Rb¨ wewfbarmP‡Ki MvZvvivi c®YZv¸ jv‡K Z¸i aiv| Avgv‡`i fuel¨r KgRv¢Ûi cwiKíbv ubf¶ K‡i AZxZ MvZvvivi Dci| G mKj MvZvviv we‡kÛY Acwinvh© Avi cwimsL¨¢bMZ c×wZB GKgvÎ G mKj we‡kÛ‡Yi m∓-I c†°jb c¶vb Ki‡Z cv‡i |

cW 1-G c¤ÖË cwimsL¨¢bi msÁvwU‡K ch©‡jvPbv Ki‡j †`Lv hvq †h, GKwU wejq ubmv‡te cwimsL¨b mvaviYfv‡te ubgwji iwZ Kvhv©jx¸ jv m¤úv`b K‡i:

- *Z_¨ msMÖn*
- *Z_¨ web¨¯KiY*
- *Z_¨ msw¶ßKiY*
- *Z_¨ Dc¯vcb*
- *Z_¨ we‡kÛY*
- *Z_¨ we‡kÛ‡Yi Dci wfwˇ K‡i mwuVK Dcmsnvi †U‡b †hŠw³K w›×všÍMÖnY|*

G mKj Kvh©ejx me ai‡Yi cwimsL¨vbMZ PPvP g‡a¨B j¶¨ Kiv hvq| GB Kvh©ejx ‡jv‡K `ÿU chvb fv‡M fvM Kiv hvq| c‡_gwU n‡jv eY©vgj-K Ges wZxqwU n‡jv wm×všÍmyvšÍ|

eY©vgj-K Kvh©ejx (Descriptive Functions)

Avgiv hLb wµ‡KU †Ljvi cwimsL¨vb wb‡q Av‡jvPbv Kwi ZLb Avgiv eY©vgj-K cwimsL¨v‡bi e¨envi K‡i _wK| Av‡jvPbvi weei‡Yi g‡a¨ evsjv‡¨‡ki wµ‡KU `j †gvU KZ ivb K‡i‡Q, KZ Ifvi †L‡j‡Q, KZwU DB‡KU †c‡q‡Q, †Ljv †`L‡Z gvV KZRb `k©Ki Dcw¯^Z wQj, BZ¨vw` we‡lq KZK¸‡jv msL¨vi D‡jL _v‡K, hv wewfbœZ_¨K wbweofv‡e Dc¯^cb K‡i| wewfbœ‡mc‡Z‡`‡bi mviwY¸‡jv‡Z Dc¯^cZ Z_¨ejx wewfbœejZgi ms¶¶ß eY¶Qvov Ab¨ wKQy bq|

mvgwMRK M‡el‡Yvq c‡ÿkt Avgiv Ggb wee‡ZKi cwiw¯wZi m¤§ybœ nB †h, msM¸xZ c‡ÿwU DcvË Av‡jv¨vfv‡te GKwU msL¨vi c‡ÿwbwaZ¡K‡i‡j I mvgwMK fv‡te G¸‡jvi wK A¸©enb K‡i Zv Zvr¶¨wYKfv‡te †evSv m¤¢ nq bv| aiv hvK, GKwU M‡el‡Yvq gvV Kgv¶iv 300 c‡ÿgvjv ci-Y K‡ii wb‡Zq G‡tm‡tQ| c‡ÿwU c‡ÿgvjvq G‡tKK Rb DËiï¯vZZv m¤ú‡tK©c‡ÿž Z_¨ i‡t‡tQ| c‡ÿwU c‡ÿgvjvvi cvZbv Dë¨‡tj A‡tbK †tKŠZbÄ‡tjvÏxcK Z_¨ †tPv‡tL co‡te| wKŠ¸µgwMŠZ 300 c‡ÿgvjv †t`LZv †tKI n‡j †tKŠZb¸x A‡tbKUv K‡tg _v‡te| †tKbbv, Avj¨¶vfv‡te 300 c‡ÿgvjv †tKvb mvgwMK wP¶ cÔvb K‡ti bv| †tm †t¶t¶I¶ DcvËt‡K web¨¯ÍK‡ti wKQymm¶ß cwigv‡tci gva¶g c‡tKvk K‡t‡tZ nq, hv Zvr¶¨wYK M‡tel¨vi DtÏk¸¸tjvtK c‡tZfZ K‡ti †tZvtj| Avi G¸‡tjv m¤ubœKiv m¤¢ nq NUbmsL¨vi webvm, kZKiv, Ab¸yvtZ, Mo, cwiw¶Z e¨evb Ges mn-m¤útK©¶ mnM-Gi gZ cwimsL¨vbK cwigvc¸tjv wbYÒqi gva¶tg| thgb, H M‡tel¨vq Ašífv e¨w³‡t`‡ti Mo egm 42 eQi, Mo wetqi egm 23 eQi, 48 kZvsk bvix RbtlbqštYi c×wZ e¨envi K‡tib, BZ¨vw`|

G mKj cwigv‡tci gva¶tg Avgiv GKwU eY©vgj-K wP¶ t‡tc¶v _wK| Z‡te GwU g‡tb ivLv c‡tqvRb †th, "wf msL¨K cwigv‡tci gva¶tg Avav msL¨K DcvtËi ms¶¶ßKiY DcvtËi AtbK c¶vtbvj2L L¶b-bwU nwi‡tq †t`tj| hvi d‡tj, wewåwšÍKi djvdj c‡tÙßi m¤ebv îZix nq| AZGe, c‡ÿwU ms¶¶ßKitYi dtj D™³Z mvgve×Zvi K_v Dcvti eivtYvi c‡te©D‡tjL Kiv AvekÄK|

wm×všÍmyvšÍ Kvh©ejx (Inferential Functions)

wbewPZ bg¨vi gva¶tg c‡tÙ Dcvtëi eYvB h‡t¨ bq| KL‡tbv KL‡tbv G mKj eYvgj-K cwimsL¨v‡tbi ¶wKó¸‡tjvi wfwˇtZ mgwMK m¤útK©GKwU avivYv †tbevi Ges c‡tÙ ¶wKó¶ mg‡tni e¨vL¨v †t¨evi c‡tqvRb n‡tq cto| Avi GB KvRwU m¤útbœKiv nq mvaviYvtKiY msyvšÍ cwimsL¨vb wbY©¶i gva¶tg| G mKj cwimsL¨v‡tbi wfˇtU Aek¨ MwewYvZK m¤¢ebv Z‡tÉ¶i Dci wbfÕ³kiiY Ges wKQ¨tyv R¶j c‡tKwZi| ci¶¶¶Ygj-K M‡tel¨v, Ab¨¶i ci¶¶Y, cwigv‡tci åw¶ì wbY©¶, bg¨vi åw¶ìwbY©¶, wbfÕ³½Ži mnM wbY©vn Av‡tjv Rtjj Ges D"Pgvtbi cwimsL¨vb wbY©¶i gva¶tg PjKmg‡t¨i gta© m¤útK©I Kvh©KvitYi e¨vL¨v c‡tÙ K‡ti _t¶K|

†tKb msMZ Z‡t_¨i Dci wfwË K‡ti wm×všÍMÖhY Kiv c‡tqvRb Zvi †tek wKQyev¶t¨¶m¤§Z KvtY i¶t¶tQ| me‡tP¶q ¯úó KvitY¶U nj mgq I e¶q ms¶¶ß| wbewP‡tbi c‡te©Gi djvdj m¤útK©avitYv wbtZ wMtq t¶‡tki ci¶v †tfwUvi RbtMvôtK c¶ceiKivU nte Aev¶te, mgqmvv¶ Ges e¶qmvtc¶¶| tm t¶t¶Î, GKwU wbatñiZ GjvKvti †tfU `t¶ti thwM¶ GKwU wetkl RbtMvôtK wbewPb Kit¶ nte| thgb, XvKv kntii 18 eQi ev Z`a¶ñRbtMvôx, hvtK H M‡telYvi mgMÖ

e‡j ıPıýZ Kiv hıq | Gici H mgMÎK †‗‡K bgbıq‡bi gva¨‡g Aí msL¨K ıbeñPZ e¨ı³i ıbKU †‗‡K DcıËi msMÎ Kiv n‡q ↓t‡K | bgbıv †‗‡K msMpıZ DcıËi Dci ıfıÏ K‡i ıeıfbæ cıimsL¨ıbMZ c×ıZ e¨enı‡ii gva¨‡g mgMÎK m¤úÌK aviYv †bqı n‡q hı‡K, ev GKıU cÏ°jb ıbYÎ Kiv n‡q _ı‡K |

bgbıv †‗‡K cÎß cÏ°jbıU mgMÎKi %ııkó¨‡K memgq m²fı‡e aviY Ki‡e Ggb †Kıb ıbÕqZı ‡bB |

Z‡e GıU g‡b ivLı cÎqvRb ‡h, bgbıv †‗‡K cÎß cÏ°jbıU mgMÎKi %ııkó¨‡K memgq m²fı‡e aviY Ki‡e Ggb †Kıb ıbÕqZı ‡bB | Zın‡j ıKfı‡e Aıgiv Rıb‡ev ‡h, bgbıv cıimsL¨ıbıU cıvgıb‡K cÎZıbıaZ¡ Ki‡Q ıK bı? Zıv ıbıõZ fı‡e bı ejıv †M‡jı I GKıU m¤ĕebı ıbY˜qi Kiv m¤ĕ | m¤ĕebı ıbY˜qıi G mKj †KŠkj m¤ú‡K©cieZÎ©Aa¨vq¸‡j ıv‡Z ıeˆıwiZ Aı‡jıPbı Kiv n‡te | ım×ıšímsµıvšícıimsL¨ıbi †¶‡Î å¨ıšıi gıvÎ ıvt‡K KLıb»B `ı- Kiv m¤ĕ nı‡e bı, Z‡e Zıv ıbY˜i I ıbqšĲ Kiv m¤ĕ |

mvivsk

cıimsL¨ıb PPÎ©i KZ¸‡j v D‡Ïk¨ iı‡qtQ | †m¸‡j v nı‡jv: Z_¨iıık‡K GKıU mıbıvˆ©i msL¨mPÎK DcıË Dc¯vcb Kiv; e¸r AıKı‡ii Z_¨iıık‡K mijıKiY I ‡kΫxe× Kiv; Z¸bıvgj-K ıe‡kıÏ‡Yi c×ıZ mieıvn Kiv; bıiıZ ıbaÎı‡tY miKıvi, cÎkıvmb, ıbí cıiPıjK, I bıiıZ ıbaÎıK‡`ıi mnıvqZıv Kiv; I bıiıZ ıbaÎıY I fıeı¯r KgØešıv cÏq‡bi Rb¨ ıeıvfbımmPÎıKı MıvZZıvıvıi cÏYZıv Z¸j aiı ıv | cıimsL¨ıtbi `ıÎU cÎıvb Kı¬h̨ějı iı‡qtQ | GKıU n†jıv eYĐıvgj-K, Ges Ab¨ıiU n†jıv ım×ıvšímsµıvšı |

cv‡VvËi gj-¨vqb

ˆbe®ñ³K cŘœ

mvlWK DˡË‡i i cv‡k wlUK (√) wPý w`b –

1| cwimsL¨vb PP®ñ Ab¨Zg D‡Ï¨k¨ n‡"Q:
   K. Z_¨iwwk‡K msMlh Kiv
   L. Z_¨iwwk‡K mwwn‡Z¨ i¡cvšhiZ Kiv
   M. Z_¨iwwk‡K GKwU mwmlbw`®msL¨mPK Dcv‡Ë Dc¯vcb Kiv
   N. Z_¨iwwk‡K gvbwP‡Î i¡cvšhiZ Kiv

2| cwimsL¨‡bi `ßjU cˆvb Kv‡R n‡"Q:
   K. eYÞvgj-K/e¨vL¨v msµvšÍ
   L. e¨vL¨v msµvšÍ/Av‡j¨vPbv msµvšÍ
   M. wm×všÍmsµvšÍ/e¨vL¨v msµvšÍ
   N. eYÞvgj-K/wm×všÍmsµvšÍ

3| mvwgZ Z‡_¨i Dci wfwË K‡i wm×všÍMÖhY Kivi Ab¨Zg KviY:
   K. Kr‡KŠkjMZ m‡jhwM-mw¾eavi Afve
   L. mgq I e¨‡qi Kg c®qvRb
   M. †ekx ‡j¨vKej wb‡qv‡Mi c®qvRb
   N. †ekx M‡elYv cˌZ‡e`b chÞ‡j¨vPbv Ki‡Z nq

msw¶ß cŘœ

1| cwimsL¨‡bi eYÞvgj-K Kvh†P‡jx Av‡j¨vPbv Ki‡b|

2| cwimsL¨‡bi wm×všÍmsµvšÍ Kvh†P‡jx Av‡j¨vPbv Ki‡b|

iPbvgj-K cŘœ

1| cwimsL¨vb cv‡Vi D‡Ï¨k¨ Av‡j¨vPbv Ki‡b|

2| cwimsL¨vb cv‡V eYÞvgj-K Ges wm×všÍ msµvšÍ Kvh†P‡jxi msÁv I cv_®K¨ D`vniYmn
   Av‡j¨vPbv Ki‡b|

cW - 3

mʋgwrRK M‡eIYʋq cwimsL¨‡bi ¯ʋb
The Place of Statistics in Social Research

GB cwV ‡k‡I hʋ Rʋbʋ hʋ‡e —

- *cwimsL¨ʋbMZ Dcʋ‡Ëi Drm*
- *M‡eIYʋ cⱥuqʋq cwimsL¨‡bi ¯ʋb*
- *cwimsL¨ʋb c×ʋZ e¨envⱥi i ʋbaⁿiKmgⁿ*
- *cwimsL¨ʋb c×ʋZ e¨envⱥi i ⱥiⱥZ cY©chⁿq*

cwV 1 Ges cwV 2-Gi AʋⱥjʋPbʋq GʋU cⱥZqgʋb nⱥq‡Q ¯th, cwimsL¨‡bi ‡gʋvo‡K Z‡_¨i e¨envi Aʋgʋ‡`i cⱥZʋnK Rʋⱥebi mʋ‡_ IZ‡cⱥZfʋ‡te Rʋo‡q iⱥq‡Q| GKʋU KʋíZ D¨vniY ʋ`‡q ʋeIqʋU cix¶ʋv K‡i †¨Lv hʋvK| Kʋig mʋʋne GKʋU †emiKʋix cⱥZôʋ†b PʋKⱥx K‡ib| Zui gʋmK †eZb 9500 UʋKʋ| ʋZʋb mgʋRʋeÁʋtb Gg.Gm.Gm. cʋk K‡i†Q0b| ʋZʋb ʋeewnZ Ges 2 mš̄l‡bi RbK| 2 mš̄l‡bi g‡a¨ 1ʋU ‡g‡q I 1ʋU †Q‡j| ‡g‡qʋUi eqm 10 eQi I †Q‡jʋUi eqm 7 eQi| mK‡tj ¯‡gj hʋevi c‡e©‡g‡qʋU Rʋbⱥjʋtv ¯th, Zvi 1ʋU AsK I 2ʋU Bs‡tiRx LʋZʋ cⱥqʋvRb| †Q‡jʋU Rʋbⱥj‡tv, Zvi 1ʋU jʋj I 1ʋU KʋtʋU iⱥ‡0i Kjg cⱥqʋvRb| ¯ⱥ Rʋbⱥtjʋb jʋÛ‡tZ 2ʋU kʋU,© 2ʋU c¨ʋU I 3ʋU kʋvox †¨qʋv AʋⱥQ †mⱥtjʋv AʋbⱥtZ n‡te| Kʋig mʋʋne mKʋtji bʋ¯l †m‡ti, e¨vsK †‡tK 2000 UʋKʋ Zⱥj 10Uʋi g‡a¨ Aʋⱥd‡m tcⱥˡ0‡jʋb| Aʋⱥd‡mi KʋR †m‡ti ʋeKʋj cⱥRʋUʋvi mgq e¨Rʋ‡ti ʋMⱥ‡tq 200 UʋKʋi gʋvo-gʋvsm, 70 UʋKʋi kʋⱥâ, 120 UʋKʋ ʋ`‡tq †Q‡tj-‡g‡tqⱥt`i Rb¨ LʋZʋ Kjg I 20 UʋKʋ ʋ`‡tq GKʋU mʋßʋnK g¨ʋMwⱥRb ʋK‡tb jʋÛª †‡tK Kʋvco ʋb‡tq ʋZʋb e¨mʋvq †dⱥtib|

Dc‡ti e¨Y©Z Kʋíz Kʋig mʋvⱥn‡tei GK ʋ`‡tbi ‡tiʋvRbʋgPv ‡‡tK ‡ek ʋK0yZ_¨¨ msL¨ʋvi AʋvKʋvti Aʋvgʋⱥtⱥi`i mʋv‡tb Dc¯ʋwcZ nⱥq‡tQ0| G mKj msL¨ʋvi gʋvⱥ†g GKRb e¨ʋwⱥªi gʋmK Avq, ʋk¶ʋvMZ ‡thvM‡tⱥZv, ‡tckʋv, mš̄l‡tb msL¨ʋv, cwievⱥtii AʋvKʋvimn ʋ`‡tbi KgⱥƒvÛ I Rʋⱥebh¨Îvi gʋvb m¤útK©GKʋU aʋviYʋv cʋvIqʋv hʋvq| GB GKRb Kʋig mʋvⱥn‡tei †Km ÷ʋWi gʋvⱥ†g Aʋvgiʋv evsjʋvⱥ‡tki gʋ¨eÜ cwievⱥtii Rʋⱥeb h¨Îvi gʋvb m¤útK©M‡tIYʋv Kiʋ‡tZ cʋwi| G ‡¶‡t‡tÎ cwimsL¨ʋvb ⱥtjʋv ‡tKʋvb m¨yse× c×ʋZ e¨envⱥi K‡ti AʋvniY Kiʋv nⱥqʋvb| ʋKš̄ cⱥZʋvZⱥvU Z_¨¨ GLʋⱥvtb Zvi ʋbR¯ʋv ʋb‡tq Dc¯ʋwcZ nⱥq‡tQ0| Z‡te GⱥtU g‡tb iʋvLʋv cⱥqʋvRb ¯th, †Km ÷ʋWi gʋvⱥ†g cⱥß Z_¨¨ ʋ`‡tq mʋvaiYⱥKiY Kiʋv m¤‡¢ bq Ges mgMÖ Rb‡tMʋvôx m¤útK©GKʋU mʋvaiY eYʑv †`qʋv hʋvq bʋ, bʋ hʋvq Gi ʋwfⱥªÚZ †Kʋvb ʋm×ʋš̄lⱥMhⱥY Kiʋv|

mʋvaiY eYⱥvbvi Rb¨ GKʋU mʋvgwrRK Rʋwi‡tci cⱥqʋvRb| ‡tmB mʋvgwrRK Rʋwi‡tci gʋvⱥ†g cⱥß Z_¨¨iⱥvkⱥtK msⱥ¶‡tß Kⱥti KZ‡tjʋv cwigʋvtci gʋvⱥ†g cⱥvk Ki‡tZ nⱥq| †thgb, kZKiʋv nʋvi, Mo gʋmK Avq, Mo mš̄l‡tb msL¨ʋv, cwievⱥtii Mo AʋvKʋvi, BZ¨ʋvⱥv`| c‡tjʋv Rʋt‡tMʋvôx m¤útK©ʋwm×ⱥ·Lʋ MhⱥY Ki‡tZ n‡tj mgMÖ †‡tK bgⱥ`v ʋbe⁰Pb K‡ti Dcⱥ‡tË msMÖ¨n Ki‡tZ n‡te| e¨Y©ʋvgj-K ev e¨L¨vgj-K th ai‡tYi M‡tIYʋvB Kiʋv †tnʋvK bʋ †Kb †m †¶ⱥ‡t‡tÎ GKʋU mⱥ·Lj c×ʋvZi cⱥuqʋwU nⱥtjʋv GKʋU M‡tIYʋv bKʋkʋv| GKʋU h_ʋ¨©M‡tIYʋv bKʋkʋv e‡tj †‡tte cwimsL¨‡tbi KZʋvUⱥkye¨envi, †Kʋvb cwimsL¨ʋvb e¨envi Ges wK gʋvtⁿ�î‡vq e¨envi Ki‡tZ n‡te|

cwimsL¨vbMZ Dcv‡Ëi Drm (Sources of Statistical Data)

mvgvwiK M‡elYvq cwimsL¨v‡bi ¯vb wbY¢qi Rb¨ cwimsL¨vbMZ Dcv‡Ëi c˝Kvi‡f`¸‡jv vuK Zv Rvbv c˝qvRb| ‡Kbbv, cwimsL¨vbMZ Dcv‡Ëi aiY I we‡kl‡Yi c˝KˆZi Dci wbf¢K K¡‡te cwimsL¨v‡bi e¨envi‡i i MfxiZv| cwimsL¨vbMZ Dcv‡Ëi ŸU cˆwb c˝Kvi‡f` i‡q‡Q: c§‡ygK I gvv¨ygK Dcv‡Ë|

c§‡ygK Dcv‡Ë: *‡Kvb we‡lq M‡elYvi D‡ŸÏ‡k¨ c§‡ge‡ti i gZ msMœgxZ Z_¨‡K c§‡ygK Dcv‡Ë e‡j| G mKj Dcv‡Ëi Drm¸‡j¨ v n‡jv th Rb‡Mvôx ‡_‡K Z_¨ AvniY Kiv n‡"Q ‡mB Rb‡Mvôxi c§ZwU GKK| ‡hgb, Xv‡Kv wek‡e¨vj‡qi QvÎ-QvÎx‡`i Av_©mvgvwiK cUfwg Rv‡bevi D‡ŸÏ‡k¨ cwiPwjZ M‡elYvi GKK n‡jv Xv‡Kv wek‡e¨vj‡qi QvÎ-QvÎx‡e¸‡`| GB QvÎ-QvÎx‡e¸‡B n‡jv c§‡ygK Dcv‡Ëi Drm| Z‡te ‡Kvb c˝Kvi we‡kl‡Yi ce©ch§‡Sˇwfb¨eD‡‡ygK msMœgxZ Z_¨I c§‡ygK Dcv‡Ë wnmv‡te we‡te wPZ n‡Z cv‡i|*

‡Kvb we‡lq M‡elYvi D‡ŸÏ‡k¨ c§‡ge‡ti i gZ msMœgxZ Z_¨‡K c§‡ygK Dcv‡Ë e‡j|

gvv¨ygK Dcv‡Ë: *hLb ‡Kvb we‡kI D‡ŸÏ‡k¨ cwiPwjZ M‡elYvq c¨ŝ Z_¨iwwk‡K GKwU c˝Z‡e`‡ib Dc¯vcb Kiv nq, ZLb ‡m mKj c˝KwkZ Z_¨‡K gvv¨ygK Dcv‡Ë e‡j| gvv¨ygK Dcv‡Ëi Drm wnmv‡te Av`gigvix c˝Z‡e`‡b, wewfbœmvgvwiK Rwic c˝Z‡e`b, c˝ cwKKvq c˝KwkZ Z_¨, ewew³MZ Wˇqix, Dcb¨vm, KweZv, GgbwK Ab¨‡K ‡jLv wPwˆcÎI we‡te wPZ n‡q _‡vK| GB cv‡Vi i i‡Z th KwíZ Kwig mv‡tn‡ti ‡ivRbvgcwUi D‡jL Kiv n‡tqtQ Ggb ‡ivRbvgcvI gvv¨ygK Dcv‡Ëi Drm n‡Z cv‡i|*

hLb ‡Kvb we‡kI D‡ŸÏ‡k¨ cwiPwjZ M‡elYvq c¨ŝ Z_¨iwwk‡K GKwU c˝Z‡e`‡ib Dc¯vcb Kiv nq, ZLb ‡m mKj c˝KwkZ Z_¨‡K gvv¨ygK Dcv‡Ë e‡j|

M‡elYv c˛jˇqqq cwimsL¨v‡bi ¯vb (Place of Statistics in Research Process)

mvaviYfv‡te GwU g‡tb n‡Z cv‡i th, mKj Z_¨ msMÙni ci Dcv‡Ë we‡kl‡Yi ch§‡qB ‡Kejgvˆ cwimsL¨vb ev cwimsL¨vbMZ c×wZ e¨envii c˝qvRbxqZv i‡tq‡tQ| Dcv‡Ëi ‡kÝxe×KiY, msˆ¶ßKiY, we‡kl‡Y Ges ‡m¸‡jv Dc¯vc‡bi ‡¶‡Î B ‡Kej cwimsL¨vbMZ Av‡vbi c˝qvRb| Avi GRb¨ GKRb cwimsL¨vbwe‡`K wb‡qwM wM¨‡tjB ‡Zv P‡j, mgvRweÁv‡bxi G we‡lq ‡tekx fveevi c˝qvRb wK? hw¨ ‡Kvb M‡elK Ggb gZ ‡cvlY K‡ib, Z‡te AwfÁ cwimsL¨vbwe‡`‡t¨ i g‡tZ wbwÕZfv‡te ej¨ hvq th, M‡elYvi djvdj n‡te nZvkve¨ÄK| GKRb m‡tPZb M‡elK PU&K‡tiB e‡tŚ ‡tdj‡teb th, Dcv‡Ë we‡kl‡Y I Gi Dc¯vcb hw¨ I ‡kl ch§‡qi KvR wKš' Gi cwiKíbv ‡tZv KvtZ n‡te ‡ïiˆZB| KviY, Dcv‡Ë we‡kl‡Yi c˝iˇK ch§‡q bv Ki‡tj ‡tkl ch§‡qi we‡kl‡Y mwUK I we Ávbbm¤§Z n‡te bv| Dcv‡Ë we‡kl‡Yi c˝iˇK cwiKíbv GZ¸ iˇ¶c¥©th, Dcv‡Ëi we‡kl‡Y wK ai‡tYi, KZUKZMfˆi‡ti Ges wK gvˆÎvq n‡te Zvi wfˇÇZ Dcv‡Ë msMÙni j‡t¶¨ ‡eüZ nwZqvi-Gi we¨bi, bgˆyi AvKvi, BZ¨w¨ ¨ ubaffiˇZ nq|

Dcv‡Ë msMÙni nˇZqvi ubg#tYi ‡t¶‡tÎ cwigvc c×wZ, cˇ¨¨ I PjKmgˇtni KvhˆÑi msÁvqb (operational definition) c˝qvRb| KvhˆÑi msÁvqtbi ci ‡tmB msÁv Abyqvqx c˝Ô cwigvcK ev mPK¸ tjvi (indicators) wfwˇZ cˆˇKiv Ges Gi Dˇtii ‡tkÝxefve (response categories) Kiv c˝qvRb| Avi GB cwigvc c×wZ cˇqv‡tMi Rb¨ cwimsL¨vbMZ ‡tKŠkj e¨envi Kiv n‡t_vtK| GB ‡tKŠkj¸‡tjv KZ RˇUj I D"P ch§‡qi n‡te Zv wbf¢ K‡ti Dcv‡Ëi KZUKym²Zv GKRb M‡te‡tKi Kvg¨| G ‡t¶‡tÎ cwigvˇtci wbf¢thwM'Zv I h¸ _¸_Zv L¨eB ¸ iˇ¶c¥© bgˆyqtbi wfwˇZ mgMMK m¤ûtK© wm×vš‰ MÖntYi Rb¨ cwigvˇtci åwšŚ (measurement errors) wbY# cwimsL¨v‡tbi Avi GKwU ¸ iˇ¶c¥©KvR| Z‡te Gi Rb¨ wK0ⁿy RˇUj I D"P ch§‡qi cwimsL¨vb e‡ierv¨ii c˝qvRb n‡tq c‡to|

bg¿yqb (sampling) *Av‡iKwU ch⁰q, ¡hLv‡tb cwimsL¨¡tbi e¨envi GKwU ¸ia†Zç¥©¯ub `Lj K‡i Av‡tQ| hw` GKwU m¿gwRK M‡elYvq Am¤¢ebv* (non-probability) *bg¿yqb c×uZ e¨envi Kiv nq Z‡te †Zgb †Kvb RwUj¡ cwimsL¨¡vbMZ c×uZ e¨envt¡ii c‡tqvRb c‡to bv| uKŠ¯ Avgiv Rwnb ¡th, Am¤¢ebv bg¿yqb c×uZ e¨envi K‡i ¡h M‡e¡Yv cwiPwjZ nq ¡tmB M‡e¡Yvq c⁄ß djvd‡ji ubf⁰‡thwM¨Zv, h_v_©Zv I M¿hY‡thwM¨Zv ubtq A‡bK c¶¢œ‡tZvj¡v th‡Z c‡ti| AZGe, Gme mgm¨ir Govtbvi Rb¨ M‡elKMY memgqB m¤¢ebv bg¿yqb* (probability sampling) *c×uZ e¨envi K‡i _v‡tKb| ¡tm t¶¡‡tÎ bg¿yvi AvKvi, m²Zv, bg¿yv åwšÎ cwigvY, bg¿yv GKK, BZ¨w¡` ubaf¡n‡tYi Rb¨ MwwYwZK Z‡tÉ¡i Dci wfw‡Ë K‡ti D™‹weZ cwimsL¨¡vbMZ c×uZ e¨envt¡ii c‡tqvRb c‡to| m‡tef¡cwi, ¡th `¶¡tU welq M‡telYvvi ¨iatZB cwimsL¨¡vb e¨envt¡ii gvÎv I Mfxi¡Zv ubaf¡nY K‡ti Zv ¡n‡tjv M‡telYvvi aiY I D‡tï k¨©| M‡telYwwU hw` eYⁱvgj-K* (descriptive) *nq, Z‡te ¡tmB M‡elYvq c⁄ß DcvË we‡tkd‡l‡tYi t¶¡‡tÎ e¨eüZ cwimsL¨¡tbi c×uZ †Zgb RwUj bvI n‡tZ c‡ti| uKŠ¯ bg¿yv bKÒkvi* (sample design) *t¶¡‡tÎ cwimsL¨¡vbMZ c×uZi e¨envi D"Pg¿vt¡biB n‡tZ n‡te| Avi hw` M‡telYwwU e¨vL¨vgj-K* (explanatory) *ev cix¶¡vgj-K* (experimental) *nq, Z‡te M‡telYvvi ¨iat_‡tK ¡tkI ch⁰SÎD"Pg¿vt¡bi cwimsL¨¡vb c×uZ e¨envi Acwinvh⁰e¨ †Km ÷wwWvgj-K M‡telYvi t¶¡‡tÎ mwavi¡Y cwimsL¨¡vb c×uZ e¨envt¡ii gva¨tg M‡telYv m¤¢úbœ Kiv hvq| A‡bK t¶¡‡tÎ cwimsL¨¡vb (msL¨¡vMZ At_*©e¨envt¡ii c‡tqvRb _vKt¡j I cwimsL¨¡vbMZ c×uZ e¨envi bv K‡i‡tj P‡tj| D`vniY wnmv‡te Avgvt¡`i KwⁱZ Kwig mu‡tnt¡ei t¡ivRbvgPwwU D‡tjÖ¡L Kiv th‡tZ c‡ti|*

GB ch⁰¡q G‡tm c¶¢œ‡tZvj¡v th‡tZ c‡ti ¡th, cwimsL¨¡¡tbi e¨envi hw` GZB ¸iatZç¥©©Ges c‡tqvRbxq nq, Z‡te c⁰KwZZ we¡Áv‡tbi kvLv¸‡tjv ¡thgb, c`v_⁰_fe`¨i, imvqbwe`¨i, BZ¨w¡` welq¸‡tjv cwimsL¨¡¡tbi wek¨¡ e¨envi bv K‡ti I †Kb GZ ubf⁰‡thwM¨¡, h_v_©I M¿hY‡thwM¨¨ ntq D‡tV‡tQ? Gi e¨L¨wU cwi⁰@wi| AvcvZt¡`ç¡tÓtZ g‡tb n‡tZ c‡ti ¡th, c⁰KwZZ we¡Áv‡tbi A‡tbK kvLvvB kZ kZ eQi a‡ti welwukZ nt¡q‡tQ Av‡tivnx cwimsL¨¡tbi (inductive statistics) *e¨envi Qvovv¡B| †Kbbv, G mKj we¡Áv‡tbi M‡telYv¸‡tjv cix¶¡vgj-K Ges ¡tm¸‡tjv cwiPwjZ nq ewn⁰K Dcv`v¡vb ubqwušÎ M‡telYvMy‡ti| M‡telYv hZ ¡tekx ewn⁰K Dcv`v¡vb ubqwušÎ M‡telYvMy‡ti cwiPwjZ n‡te, cwimsL¨¡vbMZ †KŠk‡lj e¨envt¡ii c‡tqvRbxqZv ZZ Kg n‡te| m¿gwRK M‡telK th‡tnZzzDb¡?¡ gvt¡V M‡telYvq ubtqwvRZ _v‡tKb, t¡mt¡nZzztm ait¡Yi ubq¿š¡Y t¡mLv‡tb c¶¢¢Ôv Kiv m¤¢ê nq bv| t¡m At_*©cwimsL¨¡vb nt¡j¡v Mixe gv¡b¡ml¡i Rb¨ ubq¿š¡Z M‡telYwMvvi cix¶¡‡tYi wekⁱ| Z‡te GwU ¸ia†Z¡i mvt_ gtb iv¡Lv c‡tqvRb th, m¿gwRK Rwi‡tc Ges c`v_⁰_fe`¨i M‡telYvMvvi cix¶¡‡tYi t¶¡‡tÎ GKB iKg cwimsL¨¡vbMZ gj-m‡tÎⁱ e¨eüZ nt¡q _v¡tK| c¡KZz¡ct¶¡, ubf⁰‡thwM¨¨ djvdj c⁰Ôi Rb¨ ev M‡telYvi djvdj ubf⁰‡thwM¨¨ c¡gY Kiv¡i Rb¨ c`v_⁰_fe`¨i g‡tZv A‡bK c⁰KwZZ we¡Áv‡tbi kvLvvqB c¡ytc¡yt cix¶¡¡Y Kiv ntq _v‡tK| c⁰KwZZ we¡Áv‡tbi t¶¡‡tÎ cix¶¡‡tYi gva¨tg mvt¡vYⁱxKiY I m×wÒMⁱn†tYi welqwU Aek¨B cwimsL¨¡vbMZ|*

cwimsL¨¡b c×uZ e¨ent¡ii ubaf¡nKmgⁱ (Factors Affecting the Use of Statistical Methods)

Dct¡ii AvtjⁱvPbv ¡t_‡tK GwU ¯¡úó ntq D‡tVt¡Q th, M‡telYv cⁱⁱuqvi mKj ¯‡t¡iB cwimsL¨¡vb c×uZ e¨envt¡ii c‡tqvRb it¡qt¡Q| mvaviYfvÔte th mKj welt¡qi Dci cwimsL¨¡vb c×uZi e¨envi ubf⁰⁰ K‡ti tm¸‡tjv nⁱtjⁱv:

- *M‡telYvi aiY*
- *M‡telYvi Dt¡ïk¨*
- *DcvË we‡tkd‡l‡tYi gv⁰Îv I Mfxi¡Zv*

- *bgby‡qb c×¡Z*

- *M‡elYvq cÜß djvd‡ji Kvw-LZ m²Zv*

- *mvaviYxKiY I wm×všÍMÖh‡Yi gvÎv*

cwimsL¨b c×¡Z e¨env‡ii ¸iæ‡¡c¥©chÆq (Important Stages in the Use of Statistical Methods)

†h mKj chÆq cwimsL¨b c×¡Zi e¨envi Acwinvh©ntq c‡o ‡m¸‡jv n‡jv:

- *DcvË ‡ek‡dlY cwiKíbvq*

- *bgby bKÉkvq*

- *cix¶Y¬gj-K M‡elYvq*

- *DcvË ‡ek‡dlY chÆq Ges*

- *‡ek‡dZ DcvË †_‡K mvaviYxKi‡Yi †¶‡Î|*

mgv‡jvPKMY A‡bK mgq mgv‡jvPbv K‡i ¸‡Kb †h, mvgwRK M‡elYvq cwimsL¨b c×¡Zi e¨envi‡K A‡nZK AZ¨waK ¸iæZ¡ †`qv n‡q ¸‡Kb| GuU wWK †h, hw` GKwU M‡elYvi cwiKíbv `ÿf ‡e nq, ev DcvË msMÖni †KŠkjwU h¸vh¸ bv nq, Z‡e hZ cwikvbj Z cwimsL¨bB e¨envi Kiv nDK bv †Kb Zv M‡elYvi wech© †W‡K Avb‡Z eva¨| A¸®, cwimsL¨b wK0‡jZB †h‰w³K uPšÍi ‡eKí n‡Z cv‡i bv| Ab¨w`‡K, RuUj ‡ek‡dj‡Yi †¶‡Î¯ ¯Avgj-K uPšÍi ‡Kvb (intuitive thinking) †Kvb g‡ZB m¤¢ebv msgvušÍ cwimsL¨b Z‡Ëji ‡eKí bq| eYÖvgj-K ‡ek‡dj‡Yi †¶‡Î cwimsL¨b Kvh‡Zt A‡bK †ekx bgbxq GKwU nwmZqvi| Dcmsnv‡ti ejvnvq †h, M‡elYvi ‡e‡qe¯; cwiKíbv, ‡ek‡dj‡Yi Mfxi‡Zv, BZ¨w`‡i wfwˇZ GKwU M‡elYvq wK ai‡Yi cwimsL¨‡dbi e¨envi cÖqvRb Zvi DcjwäU M‡elK‡K wK mg‡q Ki‡Z n‡e| GKRb AwfÁ I mdj M‡elK †mwU h¸vh¸®v‡eB Ki‡Z m¶g nb|

mviivsk

Z‡_¨i †gvo‡K cwimsL¨‡dbi e¨envi Avgv‡`i cÖZ¨nK Rxe‡bi mv‡_ IZ‡cÖvZfv‡e RwoZ i‡q‡Q| mvgwRK M‡elYvq cwimsL¨‡dbi ¯vb ubYÆqi Rb¨ cwimsL¨bMZ Dcvˡi cÖKvi‡f`¸‡jv Rvbv cÖqvRb| cwimsL¨MZ Dcvˡi `ŠjU cÖvab cÖKvi‡f` i‡qvQ: cÖ_ugK I gvÛ‰ugK| DcvË ‡ek‡dj‡Yi mvÂK cwiKíbv M‡elYvi cÖiæ‡K chÆq bv Ki‡j †kl chÆqi ‡ek‡dlY mvÂK I we·vbm¤§Z n‡Z bv| bgby‡qtbi wfwˇZ mgMÖK m¤útK©¸m×všÍMÖh‡Yi Rb¨ cwigv‡tci åušÍcwimsL¨‡dbi GKwU ¸iæ‡¡c¥©KvR| M‡elYv cÖ¸qvi mKj ¯‡iiB cwimsL¨b c×¡Zi e¨envi cÖqvRb i‡q‡Q|

cu‡VvËi gj-¨vqb

ˆbe¶W³K cŔœ

mwVK Dˇ‡i i cu‡k wUK (√) wPý w`b –

1| mvgwiRK M‡elYvq cwimsL¨vtbi ¯vb wbY©¢qi Rb¨ Rvbv c‡qvRb:

    K. cwimsL¨vbMZ Dcu‡Ëi cŔvi‡f`

    L. cwimsL¨vb welqK eBc‡Îi bvg

    M. cwimsL¨vtbi DrcwË I µgweKvk

    N. cwimsL¨vb Avt‡j vPbvq msL¨vi ¯vb

2| DcvË we‡kl‡lYi cwiKíbv:

    K. M‡elYvi ‡kl chv‡q ‡bqv DwPZ

    L. M‡elYvi ïi ïa‡Z ‡bqv DwPZ

    M. M‡elYv ï ïai c‡e¶ ‡bqv DwPZ

    N. Z_¨ msMÖhKvjvb ch‡¢q ‡bqv DwPZ

3| cwigv‡ci åwšĺ

    K. bgyvi PwiÎ e§‡Z mvnwh¨ K‡i

    L. m¤‡ebv I Am¤‡ebv bgyvi cv_Ŕ¨ wbafÎ Y K‡i

    M. bgyvq‡tbi wfwˇZ mgMŔK m¤vú‡K¶m×všĺM›‡Y mvnwh¨ K‡i

    N. Am¤‡ebv bgyv m¤vú‡K¶mg¨K aviY ‡`q

msu¶ß cŔœ

1. D‡ÏÏk¨mn Avt‡j vPbv K iyb:

    K. cŰ_wgK DcvË

    L. gvav¨wgK DcvË

iPbvgj-K cŔœ

1| mvgwiRK M‡elbvq cwimsL¨vtbi ¯vb chŕjvPbv K iyb|

2| cwimsL¨vb c×wZ e¨enu‡i i wbafÎ Kmg‡tni h_v_Ŕv Avt‡j vPbv K iyb|

eusjv‡`k Dš§₹ uek¦e`¨vjq

cW - 4

cuimsL¨¤bi uKQytgŠuj K cŽ¨q
Basic Statistical Concepts

GB cW †k‡I hv Rvbv hv‡e —

- cuimsL¨¤bi †gŠuj K cŽ¨q¸†jv uK uK
- †gŠuj K cŽ¨qmg‡±ni msÁv I ‰eukó¨

c‡e‡P uZbuU cu‡V Avgiv †ek uKQyk‡ãi mu‡_ cuiuPZ ntq…Q| †hgb, mgMÖK, bg¦v, Z_¨, DcvË, eY®gj-K cuimsL¨¤b, um×vš¦gj-K cuimsL¨¤b, Pj K, BZ¨¨w`| Gi g†a¨ KZ¸†jv evi evi e¨eüZ ntqtQ| G¸†jv evievi e¨eüZ nq, KvuY, G¸†jv cuimsL¨¤bi †gŠuj K uelq¸†jv†K ub‡`Ř K‡i| ci eZ®Aa¨vq¸†jv‡tZ Av‡iv uKQyk‡ãi mu‡_ Avgiv cuiuPZ ntev Ges †mmKj kã¸†jvI Av‡juvPbvi g†a¨ evi evi e¨eüZ nte|

cŽuU ueÁv¤bi gZ cuimsL¨¤biI uKQyubR¯^c` i‡q…Q| GB c¸†jv‡tK cŽ¨q unm¤‡te uPuýZ Kiv nq| GB cu‡Vi ¨i‡a¤Z evi evi e¨eüZ †h kã¸†jvi K¸vejv ntqtQ †mB kã¸†jv n‡tjv cuimsL¨¤bi ubR¯^c` | Ab¨ K_vq, GB c¸†jv n‡tjv cuimsL¨¤bi †gŠuj K cŽ¨q| uOZ×q Aa¨vti Av‡juvPbvq cŏetki c‡e©†tm mKj †gŠuj K cŽ¨qmg‡±ni msÁv I ‰eukó¨ m¤ útK®†R‡tb †bqv hvK|

eY®gj-K cuimsL¨¤b (Descriptive Satistics)

Avgiv Rub †th, cuimsL¨¤bi cŗvub `ļU Kvh®ejxi gya¤ GKuU n‡tjv msMÖhxZ Z_¨ iuwk‡tK msw¶ßKi‡tYi gva¤tg A_®en K‡ti †Zvjv| G mKj msw¶ß Ges A_®en Dc¯^vcb Kiv m¤¤e nq KZ¸†jv eY®gj-K cuig¤tci gva¤tg| Aby¤vZ, kZKiv, Mo, cuiugZ e¨evb, mn-m¤útK®mnM, BZ¨¨w` n‡tjv Ggb uKQyeYb¤gj-K cuig¤vc ev cuimsL¨¤b| GB cuig¤vc¸†jvi gva¤tg uekvj Z_¨iuwk‡tK GKuU ubqš¢tht±i g‡a¨ Av¤e m¤¤e| GB cuig¤vc¸†jv ev cuimsL¨¤b¸†jv ueufbœPj‡tKi ˆeukó¨ Ges ueufbœPj‡tKi gva¤¨ m¤útK®eYb¤ †`q| cuimsL¨¤bi †th kvLv G mKj cuimsL¨¤b ubY®tqi c×vZ I †KŠkj ub‡tq Av‡juvPbv K‡ti ZvtK eYb¤gj-K cuimsL¨¤b e‡tj|

<div style="border:1px solid">cuimsL¨¤bi †th kvLv eYb¤gj-K cuigvc ubY®qi c×vtZ I †KŠkj ub‡tq Av‡juvPbv K‡ti ZvtK eYb¤gj-K cuimsL¨¤b e‡tj|</div>

um×vš¦gj-K cuimsL¨¤b (Inferential Statistics)

cuimsL¨¤bi gva¤tg ueufbœPj‡tKi gva¤ cvi¯útiK m¤útK®eYb¤B ht_ó bq, G mKj m¤útK®Kvh®KviY e¨L¨¤vi gva¤tg um×všÍ Mü†tYI cŘqvRb i‡tq…Q| AvZ bg‡yvi ˆeukt¶¨i uffwË‡tZ mgMÖt†Ki ˆeukó¨ m¤útK©um×všÍ Mü†tY n‡tjv cuimsL¨¤bi uØZxq cŗvub KvR| cuimsL¨¤bMZ um×všÍMü†tY uKQyu RuUj h\xb³i Dci cŗZwôZ, †tk‡I K‡ti m¤ûtebv Z‡tËji Dci| Abk\xí cix¶¨|Y, bg‡y cix¶¨|Y, bg‡yvi AvKvi ubafI¤Y, e¨wß cŗ°jb, cuiugZ ueb¦vm, bg‡y ueb¦vm, m¤ûtebv ubafI¤Y, BZ¨¨w` ueIq¸†tjv um×vš¦gj-K cuimsL¨¤bi AviI Zvf³¥Y| cuimsL¨¤bi †th kvLv G mKj cuimsL¨¤b c×tZ Ges ZÌ¦¨ubtq Av‡juvPbv K‡ti ZvtK um×vš¦gj-K cuimsL¨¤b e‡tj | h¤µcr mg¤uKiY-ue‡tkdIY, Dcv`b-ue‡tkd¤Y, Kvh®KviY ue‡tkd¤Y, c¸_-ue‡tkd¤Y, ‚Ugx-PjK ue‡tkd¤Y, BZ¨¨w` cuimsL¨¤b c×t¸†jv um×vš¦gj-K cuimsL¨¤bi Ab¨Zg D`vniY|

<div style="border:1px solid">cuimsL¨¤bi †th kvLv um×vš¦gj-K cuimsL¨¤b c×tZ Ges ZÌ¦¨ubtq Av‡juvPbv K‡ti ZvtK um×vš¦gj-K cuimsL¨¤b e‡tj|</div>

mÖugwRK cuimsL¨¤b cuiuPZ

cÔv - 15

Pj K (Variable)

Pj K kãшUi gɫa¨B Gi A_®U wbwnZ iɫqɫQ| th ˆeɯkó¨ Pj gʋb eʋ th ‰eɯkɫó¨i gʋɫbi cшieZⓅ NɫU ZʋɫKB Pj K ejʋ hʋq| aiʋ hʋK, ɯk¶ɭʋ GKɯU ˆeɯkó¨| GB ˆeɯkɫó¨i gʋɫbi cшieZⓅ NUɫZ cʋɫti GKɯU GKK ɫ_ɫtK Ab¨ GKɫK| ɫthgb, Kшig mʋɫtne Gg.G. cvm nɫj, iшng mʋɫtne ɯe.G. cvm nɫZ cʋɫib| Aʋeʋi dшi` mʋɫtne Gm.Gm.ɯm. cvm nɫZ cʋɫti| KшíZ GB wZb eˈш³i D"PZʋ h_ʋµɫtg 5 dɰ 6 BшÂ, 5 dɰ 10 BшÂ I 5 dɰ 9 BшÂ Ges IRb h_ʋµɫtg 60.5 ɯKɫjʋMɭg, 58.8 ɯKɫjʋMɭg I 55.5 ɯKɫjʋMɭg nɫZ cʋɫti| Aʋɫtiʋ m²fʋɫte ejʋ hʋq ɫth, Pj K nɫjʋ Ggb GKɯU cшigʋcɫthʋM¨ ˆeɯkó¨ hʋ bgɭɭʋ eʋ mgMⓅKi m`mɫɫ‡`i gɫa¨ GɫtKi AшaK gʋb cⓊkⓅ Kɫti| ɯk¶ɭʋ, eqm, Aʋq, ɯj½, ag©RʋZҳqZʋ, BZ¨ш` nɫjʋ PjɫKi Aʋɫtiʋ ɯKQʋD`ʋniY| Pj K ɯeɯfbɶcↆKʋɫtii nɫZ cʋɫti, ɫthgb, ɯeɯ"Qbɶ(discrete), Aɯeɯ"Qbɶ(continuous), ɯbfↆkҳj (dependent), ¯ʄaҳb (independent), BZ¨ш` |

‰eɯkó¨ (Attributes)

ɫKʋb e¯'eʋ eˈш³ɫ‡K eYⓅʋi Rb¨ ɫmB eˈш³ eʋ e¯í Dci ɯKQʋ¸ Yʋejx (hʋ abʋZ¥K eʋ FYʋZ¥K DfqB nɫZ cʋɫti) Aʋɫtiʋc Kiʋ nɫq _ʋɫtK| ɫm mKj AʋɫtiɯcЗ ¸Yʋejɯɫtk ˆeɯkó¨ eɫj | ɫthgb, GKRb eˈш³ɫ‡K eYⓅʋ Kiʋi Rb¨ ejʋ thɫZ cʋɫti ɫth, eˈш³U KI.K, eɭɥgʋb, mr, BZ¨ш` | AZGe, GKRb eˈш³ eʋ GKɯU e¯ɫtK eYⓅʋi Rb¨ hʋB ejʋ nDK bʋ ɫKb, ɫmɯUB ɫmB eˈш³ eʋ e¯í ˆeɯkó¨| Ab¨ɫtK, Pj K nɫjʋ ˆeɯkó¨¸ɫjʋi thŇш³K ɫMʋôxe×KiY| ɫthgb, bʋix I ciɥɥɭ nɫjʋ ˆeɯkó¨ Ges ɯj½ eʋ ɫRÛʋi nɫjʋ PjɫK, hʋ bʋix I ciɥɥɭ ˆeɯkó¨ ш`ɫtq MшVZ| mʋgшɯRK ɫkↁYx PjKɯU D"PtkↁYx, gaɫtkↁYx, ɯbaɫtkↁYx ˆeɯkó¨¸ɫjʋ ш`ɫtq MшVZ; Ges ɫckʋ PjKɯU KI.K, kↁgK, ɯk¶jK, PʋKᵢzҳRҳex, eˈemʋqx, BZ¨ш` ˆeɯkó¨ ш`ɫtq MшVZ|

ɯeɯ"QbɶPj K (Discrete Variable)

ɯeɯ"QbɶPj K nɫjʋ ɫm mKj Pj K th¸ɫtjʋ GKɯU c¥©msLïʋq MYbʋɫthʋM¨ gʋb cⓊkⓅ Kɫti| A_ʄr, G mKj PjKɫ‡K ɫKejʋgʋÎ c¥©msLïʋq cↆKʋk Kiʋ hʋq, AʋшɯkↆKfʋɫte bq| Ab¨ K_ʋq, ɯeɯ"Qbɶ Pj K KLɫtbʋ fↄшɫtki gʋb MⓅY Kɫti bʋ| ɫthgb, cшieɫtii m`m¨ msLï, ɫʄ‡ki RbmsLïʋ, bʋix ciɥɥↄli msLïʋ, BZ¨ш` | GKɯU cшieɫtii m`m¨ msLïʋ 5, 7 eʋ 8 Rb nɫZ cʋɫti, KLbB 5.25, 7.5, eʋ 8.3 Rb nɫZ cʋɫti bʋ| GKBfʋɫte, 2.7 Rb bʋix I 3.2 Rb ciɥɥↄl nɫZ cʋɫti bʋ| nq 3 Rb bʋix I 3 Rb ciɥɥↄl nɫZ nɫte, bʋZʋʋ 2 Rb bʋix eʋ 3 Rb ciɥɥↄl nɫZ nɫte|

Aɯeɯ"QbɶPj K (Continuous Variable)

GKɯU PjɫtK Aɯeɯ"QbɶPj K eɫj hLb ɫmB PjKɯU m¤ɫte¨ gʋbmg‡ni aʋiʋeшnK ci¤úiʋq ɫth ɫKʋb GKɯU gʋb MⓅY Kɫti | A_ʄr, Aɯeɯ"QbɶPj KɫtK c¥©msLïʋq Ges fↄшɫtk `ⓊfʋɫteB cↆKʋk Kiʋ hʋq| ɫthgb, eqm, Aʋq, D"PZʋ, IRb, BZ¨ш` | GKRb eˈш³i eqm KZ RʋbɫtZ PʋBɫtj Zʋi Reɫte nqɫtZʋ ɯZwb ejɫteb, 25 eQi| Reeɯ c¥©msLïʋq cↆKʋkZ nɫjʋ I cↆKZcↆ¶| nqɫtZʋ ɫmB eˈш³i eqm 25 eQi 3 gʋm 10 шˋb| ɫmB GKB eˈш³i D"PZʋ nɫZ cʋɫti 5 dɰ 8 BшÂ, IRb nɫZ cʋɫti 60.2 ɯKɫjʋMɭg, Ges gшmK Aʋq nɫZ cʋɫti 10 nʋRʋʋi 5 kZ 3 UʋKʋ 50 cqmʋ| A_ʄr, Aɯeɯ"QbɶPjɫti GKɯU aʋiʋeшnKZʋ iɫqɫtQ, hʋ Pj gʋb, KLɫtbʋI ɯeɯ"Qbɶbq| ɫthgb, mgq GKɯU Pj gʋb PjK, hʋɫtK GKɯU aʋiʋeшnKZʋq cↆKʋk KiɫtZ nq| KʋiY, mgq PjKɯUi cↆKɯZ ZB Ggb|

Sidebar notes:

¯Гaxb PjK (Independent Vairable)

GKµU Kµh⁰KµiY m¤útK℗ e¨L¨µq th PjK eµ PjK‿‡jµ µbaffi‡Ki fµgKµ cµjb K‡i ‡mB PjK eµ PjK‿‡jµtK ¯Гaxb PjK e‡j | GB ¯Гaxb PjK‿‡jµ Ab¨ †Kµb Pjµ‡Ki Dci µbf℗kµj bq | Dc‡ii D`µniY Abµµqx cüZµ`b coµ‡kµbµi mgqµU n‡jµ GKµU ¯Гaxb PjK | KµiY, cüZµ`b coµ‡kµbµi mgqµU ciµ¶¶µq cüß b¤†‡K µbaffiY K‡i | ¯Гaxb PjK‡K A‡bK mgq µbaffiK PjKI (determinant variable) *ejµ n‡q ‿µtK |*

µbf℗kµj PjK (Dependent Variable)

th †Kµb M‡eIYµ ¨iæµnq µKQycǨµµb‡q | GB cǨµ‿‡jµ A‡bK mgq GKµU Kµh⁰KµiY m¤útK℗ e¨L¨µi AµKµ‡i Dc¯µcZ nq | M‡eIK Abµµb K‡ib th, hµ` GKµU Pj‡Ki g‡a¨ µKQy cµieZ℗ N‡U Z‡e ‡mB cµieZ℗ Ab¨ Pj‡Ki g‡a¨I cÑµe ‡djµ‡e eµ cµieZ℗ NU¨‡e | GB cÑµeZ eµ cµieZ℗Z ÔAb¨ PjµU‡K۩µbf℗kµj PjK e‡j | KµiY, GB Pj‡Ki g‡a¨ cµieZ℗nµU Ab¨ Pj‡Ki Dci µbf℗kµj | GKµU D`µniYµ¯‡q µelqµU ‡eµSµ hµK | thgb, GKRb 0vÎ/0vÎx ciµ¶¶µq KZ b¤† cµ‡e Zµ µbf℗ K‡i ‡mB 0vÎ/0vÎx cüZµ`b KZ N›Uµ coµ‡kµbµ K‡i Zµi Dci | GLµ‡b ciµ¶¶µq cüß b¤† n‡jµ µbf℗kµj PjK | KµiY, ciµ¶¶µq cüß b¤† µbf℗ Ki‡Q GKRb 0vÎ/0vÎx cüZµ`b KZN›Uµ coµ‡kµbµ Ki‡Q Zµi Dci |

mgMüK (Population)

mµaµiYf¨µ‡e mgMüK ej‡Z †Kµb GKµU µbµ`℗ Gjµ Kµq emeµmKµiµx Rb‡Mµôxi mgµó‡K ‡eµSµq | µKŠ¨ cµimsL¨‡b mgMüK GKµU Rb‡Mµôx n‡Z cµ‡i, eµ †Kµb e¯i mgµó n‡Z cµ‡i, eµ cüYxi mgµó n‡Z cµ‡i, eµ e¶¶iµµRxi mgµól n‡Z cµ‡i | thgb, e¬sjµ‡`k emeµmKµiµx mKj e¨µ³i mgµó‡Ki e¬sjµ‡`ki RbmsL¨µi mgMüK ejµ hµq, Aµeµµ m¾µietbi mKj Mµô-cµjµ‡K m¾µietbi Mµô-cµjµi mgMüK ejµ hµq | cµimsL¨bMZf¨µ‡e, th †Kµb e¯'(gµb¨, cÑµx eµ Ro c`µ_⁰℗ hµ` GK eµ GKµaK GKB ᶺeµkó¨ m¤úbœµq, Z‡e ‡mB e¯i mgµó‡K mgMüK e‡j | AZGe, XµKµ µek№e`¨j‡qi mµgµµRK µeÁµb Abµµ`f§³ mKj 0vÎ-0vÎxi mgµó‡K ‡mB Ab‿µ`t`i 0vÎ-0vÎx‡t`i mgMüK ejµ hµq | XµKµ µek№e`¨j‡qi mKj µk¶¶K‡K µk¶¶K mgMüK µnmµ‡te µetePbµ Kiµ hµq | A‿¶ff, GKµU M‡eIYµi mµt_ m¤úKℸ§Ÿ cüZµU e¯'eµ e¨³i m¤úÝ⁰ mgµó‡KB mgMüK e‡j |

bgµµ (Sample)

th mgMüK‡K µb‡q M‡eIYµ cµiPµµjZ nq Zµi GKµU Ask‡K bgµµ e‡j | thgb, XµKµ µek№e`¨j‡qi cǨg e‡Iℸ 0vÎ-0vÎ‡t`i g‡a¨ µbeŵPZ GKµU Ask nj Gi bgµµ | A‿¶ff, hµ` cǨg e‡Iℸ5000 0vÎ-0vÎx _µtK, ‡mLµµb ‡_‡tK µbeŵPZ 500 0vÎ-0vÎx n‡jµ ‡mB mgMüKi bgµµ | bgµµ n‡jµ ch‡eµ¶¶YthµM¨ m¤úÝ⁰mgM‡Ki GKµU mµe-‡mU eµ GKµU Am¤úÝ⁰‡mU | XµKµ knti hµ` 10000 Mµoxi-gµµjK _µtK Z‡e M‡eIYµi Rb¨ µbeŵPZ 1000 Mµoxi gµµjK n‡e Mµoxi gµµjK mgMüKi bgµµ |

cµµgµb (Parameter)

cµµgµb n‡jµ mgMü0Ki ᶺeµkó¨ hµ bgµµ DcµtËi Dci µfiµË K‡i cܰµjZ | mgMü0Ki ᶺeµkó¨ µbt`ℸ Kiµi Rb¨ MüK eY⁰µjµµ e¨eµi Kiµ nq | thgb, mgMü0Ki Mo ‡eµSµtbµ nq MüK eY⁰µ (µgD) *cüZütKi gµa¨tg Ges mgMü0Ki cµigµZ e¨eµµb ‡eµSµtbµ nq σ* (µmMgµ) *cüZütKi*

gva¨tg| mgM₵Ki gvb w¯í ev Abo Ges mvaviYfv‡te AÁvZ _v‡K| th‡nZmgM₵Ki gvb Rvbv hvq bv, tm‡nZzmgMÄ t_v‡K ubeͤPZ bgₖvi ˆevk‡tó¨i wfvË‡Z cwimsL¨vbMZ mvaviYxKi‡Yi gva¨tg mgM₵Ki ˆevkó¨‡K c₵°wjZ Kiv nq| thgb, XvKv wek₅te ¨vj‡qi mKj QvÎ-QvÎxi Mo eqm AÁvZ| Avgiv tmₖU Rvbvi Rb¨ GKₗU bgₖv ubeͤPb Kwi Ges tmB bgₖv t_vK cÛß MoUͤK mgM₵Ki c₵°wjZ Mo wnmv‡te MÑhY Kwi| GLv‡tb g‡b ivLv c₵qvRb th, mgM₵Ki Mo gvb GKₗU Ges Acwie₵kÕkxj| Ab¨w¨ª‡K, bgₖvi Mo gvb GKₗU bgₖv t_vK Ab¨ bgₖvq wfbœ n‡tq _vtK| th‡nZzbgₖv Mo cwie₵kÕkxj, tm‡nZz‡tmB MoUͤ mgM₵Ki M‡oi KZUₖKvQvKvwQ ev cÛzbvaͤkxj Zv wewfbœcwimsL¨vbMZ cix¶‡tYi gva¨tg hvPvB Kҵi ub‡tZ nq|

bgₖv gvb (Statistic)

bgₖv gvb nj bgₖvi ˆevkó¨, hvi Dci wfiₗË K‡ti Avgiv civgv‡bi wm×všÍMₙhY K‡ti _vₖK| bgₖv ˆevkó¨‡K t¨ivgvb eYₙvjv e¨enҵ‡tii gva¨tg w₵PwₙýZ Kiv n1q _vₖK| thgb, $\hat{x}$, $\hat{\theta}$ cₗÛxK e¨env‡tmi K‡ti bgₖv MotₖK wb‡t`R Kiv n1q _vₖK, Avi cwimgZ we₵PwₘZ wb‡t`R Kiv nq $\hat{s}$ cₗÛxtKi gva¨tg| bgₖv gvb AₚZ Ges Zv bgₖv t_ₖK bgₖv tf‡‡` cwiewZₙ₵ nq| Ab¨w¨ª‡K, Avgiv Rwb th, civgvb AÁvZ Ges Zv Abo| Z‡te civgvb c₵°j‡tbi Rb¨ bgₖv gvb Zvi wfiₗË wnmv‡te KvR Kҵti|

mgvbycvZ (Proportion)

DcvₗË msw¶ßKi‡tYi c₵uqvqv Z_¨iwmₖ‡tK wewfbœtk₵Yx ev wefvM (category) wef³ Kiv nq| GB tk₵Yx ev wefvMₗttvₗt‡tK cwimsL¨vbMZ ˆevkó¨‡i wₗK t₵‡tK n‡tZ nte cₕwₗvb₵vₗ₵L (exhaustive) Ges cvi ¯úwiKfvₗte wew"Ob₵ (discontinued)| aiv hvK, tKvb GKₖU ˆevkó¨‡i PvivwU tk₵Yx ev wefvM it‡qtQ – K_1, K_2, K_3, I K_4| GB Pvi₵U tk₵Yxi tgvU msL¨v n‡tjv, $\hat{K}\hat{O}$| A₵_ₗª, $K_1 + K_2 + K_3 + K_4 = K$| G t¶‡t‡tÎ tKvb c₵ Ë tk₵Yxi mgvbycvZ n‡tjv H tk₵Yxi Aaₖtb cÛß gvbₖtK tgvU msL¨v w¨‡tq fvM Ki‡j th djvdj cvIqv hvq Zv| AZGe, K_1 Gi mgvbycvZ n‡tjv, K_1/K| GKBfv‡te, K_2, K_3 I K_4-Gi mgvbycvZ h₵µ‡tg K_2/K, K_3/K, I K_4/K| mKj tk₵Yxi mgvbycvₗt‡tZi thvₖMdj n‡tjv 1| A₵_ₗª, $K_1/K + K_2/K + K_3/K + K_4/K = K/K = 1$|

Av‡tiv mnRfv‡te ejv hvq th, wj½‡q ˆevkó¨‡i wfiₗË‡Z $\hat{\theta}$U wefvM ev tk₵Yx n‡tjv bvix I cΰal| hw` bvix = 48 I cΰal = 52 nq, Z‡te Gi tgvU msL¨v n‡tjv 100| Avi bvixi mgvbycvZ n‡tjv 48/100 = 0.48 I cΰaltli mgvbycvZ n‡tjv 52/100 = 0.52 Ges GB `\hat{\theta}$U mgvbycvₗt‡tZi thvₖMdj n‡tjv 0.48 + 0.52 = 1.00| mgvbycvZ ubYₙtqi t¶‡t‡tÎ wetkl tk₵Yxi ev wefv‡tMi gvbₖU _v‡tK j e (numerator)-G Ges tgvU msL¨vₖU _v‡tK ni (denominator)-G|

Abycvৈ (Ratio)

GKₖU msL¨v K-Gi Ges Ab¨ GKₖU msL¨v L-Gi tc‡¶‡t‡tZ Abycvৈ n‡tjv, $\hat{K}\hat{O}$ tK $\hat{L}\hat{O}$ w`‡tq fvM K‡ti Zvi cÛß djvdj| A₵_ₗª, $K/L$| Dc‡tii D`vniY Abₖyqx wj½‡q ˆevkó¨‡i wfiₗË‡Z bvix-cΰaltli Abycvৈ n‡tjv 48/52 Ges cΰal-bvixi Abycvৈ n‡tjv 52/48| GLvₗtb j¶½¨xqq welqwU n‡tjv, Abycvৈ‡K me‡tP‡tq ¶ÿ`Zg msL¨vq cₖKvk Kiv nq ni Ges je-Gi mvaviY Dcv`vbₖtK (common factor) eRͤ K‡ti| thgb, bvix cΰaltli Abycvৈ‡K 48/52 Gi cwietZₙ©12/13 ev 12:13 AvKvti cₖKvk Kiv nq| Avevi KLbI ni‡tK 1 a‡ti Abycvৈ cₖKvk Kiv nq| thgb, bvix-cΰaltli Abycvৈ

48/52 ev 12/13 ev 12:13 Gi cwie‡Z©0.92:1 AvKv‡iI cKvk Kiv nq| AbgvZ wbYŸfqi †¶‡Î ni-G _v‡K †h †kŸx ev wefv‡Mi mv‡_ Zjbv Kiv nq †mB †kŸx ev wefv‡Mi gvb Ges je-G _v‡K †h †kŸx ev wefv‡Mi Zjbv Kiv n‡”Q Zvi gvb| Avgv‡`i D`vniY Abyvqx bvix‡K ciatli †c¶‡Z Zjbv Kiv n‡”Q| Kv‡RB bvixi msL¨vi (48) Ae¯^ib n‡jv je-G Ges ciatli msL¨vi (52) Ae¯^ib n‡jv ni-G|

kZKiv (Percentage)

kZKiv mn‡RB mgvbyvgvZ †_‡K wbYŸ Kiv hvq ¨agvÎ mgvbyvgvZ‡K 100 w`‡q ¸Y K‡i| kZKiv kãUi A_©n‡jv cŸZ GKkÍtZ| A_©vr, kZKiv wbYŸfqi gva‡g Avgiv GK ai‡Yi cŸgZKiY (standardization) K‡i _wK| Avgv‡`i D`vniY Abyvqx bvix I ciatli kZKiv nvi n‡jv h_vµtg, $\left(\dfrac{48}{100} \times 100\right) = 48\%$, *Ges* $\left(\dfrac{52}{100} \times 100\right) = 52\%$ *| wewfbœ%eukto¨i wfwˇZ wbYŸZ kZKiv nv‡ii †hvMdj n‡jv 100%|*

mviwsk

cŸZwU weÁv‡tbi gZ cwimsL¨v‡tbiI wKQymbR¯^c` i‡q‡Q| GB c`¸‡jv n‡jv cwimsL¨v‡tbi †g§jK cŸq| †hgb, Pj K, wew©Qbœ0Pj K, Aew©Qbœ0Pj K, wbf©Pkxj Pj K, ¯^axb Pj K, mgMŸK, bgby, civgvb, bgby gvb, mgvbyvgvZ, AbgvZ, BZ¨w`| G¸tjv cwimsL¨v‡tbi †g§jK welq¸tjvt‡K wbt``Ÿ K‡i|

c¼VvËi gj-¨vqb

ˆbe⁹ẇ³K cĭkœ

mẇVK D�Ë‡i i c¼k ẇUK (√) ẇPý ẇ`b –

1| *Ab¸vZ Ges cẇ°igZ e¨eavb n‡j v:*
   K. *m×všbgj-K cẇimsL¨vb*
   L. *e¨L¨vgj-K cẇimsL¨vb*
   M. *eY℗vgj-K cẇimsL¨vb*
   N. *mgv‡j vPbvgj-K cẇimsL¨vb*

2| *th Pj K m¤¢e¨ gvbmg‡ni avivewnnK ci¤úivq th †Kvb GKẇU gvb MℏY K‡i Zv‡K:*
   K. *Aẇe₩″Qb∞Pj K e‡j*
   L. *ẇe₩″Qb∞Pj K e‡j*
   M. *¯⁽axb Pj K e‡j*
   N. *ẇbf℗kxj Pj K e‡j*

3| *mgMℏ*Ki GKẇU Ask‡K:*
   K. *mgMℏ*K gvb e‡j*
   L. *bgẙₙv e‡j*
   M. *bgẙₙv gvb e‡j*
   N. *Dc‡i i me KℏkU*

msẇ¶⁊|ß cĭkœ

1| *msÁv ẇ`b I cv_℞¨ Av‡j vPbv Kiub:*
   K. *eY℗vgj-K cẇimsL¨vb I m×všbgj-K cẇimsL¨vb*

   L. *ẇe₩″Qb∞Pj K I Aẇe₩″Qb∞Pj K*

   M. *¯⁽axb Pj K I ẇbf℗kxj Pj K*

iPbvgj-K cĭkœ

1| *cẇimsL¨vbi †gẞℼj K cℤ¨q₋₊j i e¨envi Av‡j vPbv Kiub|*

2| *†gẞℼj K cℤ¨qmg‡ni msÁv I ˆeẇkó¨ Av‡j vPbv Kiub|*